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ATROPHIC RHINITIS IN ITS HISTORICAL, ETIOLOGICAL AND HISTOLOGICAL ASPECTS.*

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The interest which has arisen among rhinologists to arrive at a better understanding of the lesions of atrophic rhinitis in their correlation with the clinical symptoms is the excuse for my including in this paper an exhausting but not an exhaustive review of its modern history.

The point of view from which I start is to attempt by a process of induction to lay before you and bring into prominence those facts in it which lead to the conclusion that there is some common underlying lesion which binds together the allied clinical phenomena of the different varieties of atrophic rhinitis and to indicate that affiliation with other lesions which points to the same conclusion. That lesion I believe to be a periositits of the thin scroll bones—a common enough process, but a lesion in a unique situation. Nowhere else in the body have we thin plates of cancellous bone between two layers of fibrous periosteum. Nowhere else in the body have we thin sheets of cartilage between two layers of perichondrium. In hypertrophic rhinitis, or better in all chronic rhinitis, we have a periositits. In all sinus affections we have a periositits. These being the allied local lesions with which we have to do, this being the unique bone configuration with which

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we are confronted, I turn to the account of the work done on atrophic rhinitis chiefly in modern times. After that with your permission, I will take up some of the results of my own objective study of the histology of the lesion.

HISTORY.

There is no doubt that the history of atrophic rhinitis may be traced back to the remotest antiquity in the history of civilization, especially that variety of it associated with crusts and a foul odor. It seems likely that the reference in the Talmud to a polyp in the nose causing a bad smell, to which I have referred elsewhere is an indication of its occurrence among the early Jews. The Hindu Susruta spoke of it under the name of Putinaska, as one of the thirty-one diseases of the nose. While in the medicine of the Greeks I have noted no indication of the existence of ozena, as we understand it, there is a reference in Celsus to the fact that the Greeks themselves gave the name of ozena to the literature of medicine, and he recognized that "it is hardly possible to cure this disease." He recommended its treatment, in some cases, by the application of the actual cautery, but he also employed other methods. Galen recognized it, as indeed did the post-Galenic writers, the Arabians and the physicians of the Renaissance. It may be found spoken of by Fabricius ab Acquapendente, who modified the procedure of Celsus by inserting a metal speculum in the nose, and by putting the hot iron in that, which imparted heat to the tissues without actual cauterization. This modification was adopted by later writers.

However, it is impossible always to know just how closely ancient diagnosis and differentiation corresponded with our own. That in individual cases it must have been faulty, we realize from the fact that in quite modern times we are able to note the absence of a differentiation which has become essential to our present intelligent study of the disease. I therefore hasten on to that period.

In 1866, Weber,² who had devoted himself largely to the study of the ear, contributed an article to one of the reference handbooks of surgery on nasal disease, from which it is quite apparent that atrophic rhinitis as we know it—non-syphilitic—without the presence of a foreign body, was undifferentiated at this time.

Zaufal,⁵ in 1874, claimed that the ozena present in some cases of catarrh is associated with a congenital deficiency in the development of the inferior turbinated bone. This idea that it is connected with a congenital bone-defect was many years subse-

quently (1898) expanded in the work of Meissers to the conception that it is due to an abnormal wideness of the nasal fossae, Alexander quotes Sauvages as having which is congenital. claimed, in 1763, that it is due to the nose being too narrow. Hopmann⁶ again, in 1893, had claimed the nasal fossae are congenitally too short. As recently as 1908 he has reiterated his belief in the shortening of the septum as an indication that a congenital conformation of the nasal fossae is the cause of ozena. Exactly how this condition referred to by Hopmann should have an influence on nasal affections is not very clear, nor is the idea attributed to Sauvages very suggestive, but the too great roominess of the nasal chambers, at first thought, would seem a more plausible explanation, as a greater volume of air contained in them would provide for the evaporation of a greater amount of moisture and so tend to crust-formation. But as a matter of fact, it soon appears on reflection that this rests upon erroneous conceptions. The air is a moving current, and there can be but little difference in the evaporation coefficient whether the same volume of air passes through a small chamber or a large one. In fact, so far as there is provision for evaporation the advantage lies with the normal nose as compared to the larger chambers supposedly attendant on the beginning of the atrophic process, inasmuch as the air current is more closely in contact with the mucosa and can carry away the moisture somewhat more rapidly. As a matter of fact the inception of these ideas rested upon a very insecure basis. Little has been learned of the etiology by observers using modern methods of examination and still less by students of nasal histology. The same may be said of the idea of Michel,8 in 1876, that atrophic rhinitis is essentially a disease of the accessory sinuses. This is still a prominent feature in discussions on the etiology of accessory sinus disease. It also rested, especially at that time, upon insufficient differentiation. Indeed its prominence as an etiological factor in the minds of rhinologists of the present day may be said to be due to an inadequate separation of the various kinds of ozena from one another and to the inadequate separation of different kinds of atrophic processes in the nose from one another. Crusts may form from sinus disease as well as from an atrophy of the nasal mucosa. There may be an ozena and an atrophic process which has extended to the mucosa of the accessory sinuses. Elsewhere I have recently referred to the modern history of the accessory sinus disease in its relationship to atrophic rhinitis9 and I will not refer to it here again except incidentally.

There is an atrophy of age and atrophy following nasal operations. As in almost every domain of medicine history here takes account of the differentiation of phenomena in the course of the discussion of theory and the acquisition of our knowledge of facts. Hartmann, in 1878.10 as a result of post-morten examinations had already refuted Michel's idea as to the genesis of ozena in the accessory sinuses. He was inclined to accept Zaufal's theory. Tissier, in 1894, claimed it to be a bone disease of the ethmoid labyrinth in the embryo and the infant. The accessory sinuses are thus affected in his view as a continuation of a congenital condition, the secretions forming a favorable medium for the growth of bacteria. Gerber, in 1900, examined the question of nasal anomalies in their relation to the etiology of ozena and came to the conclusion that the roominess of the fossae and a depressed nasal arch (chamaeprosopia and platvrrhinia) often combined with syphilis, are predisposing factors. In later years there has been a recrudescence of the belief that ozena is due to a necrosing ethmoiditis13 and again the ethmoid and sphenoid cavities have been vigorously attacked.

In the early work of B. Fraenkel,14 in 1876, may be noted the first attempt to separate cases of true ozena from those of syphilitic ozena. While he thus erected the typical atrophic rhinitis with ozena into a separate entity, he failed to indicate that it was dependent also upon a bone change, as is the ozena of a syphilitic nose. His idea that it was a specific change in the secretions was a natural prelude to the belief which soon arose that this depended upon some specific form of bacterial life. Loewenberg¹⁵ described in 1885 a bacterium constantly found in the secretions of ozena and this has been many times confirmed by other observers since Klamman, 16 Thost, 17 Seifert, 18 Strauch, 10 Valentine, 20 Hajek,21 Reimann,22 Abel,23 Struebling,24 and others contributed to the bacteriology of ozena within a few years after Loewenberg's paper; but the etiological importance of these bacteria, in spite of much recent literature as to other germs, has not been accepted as preponderating in the causation of atrophic rhinitis, and it can not be said that bacteriology so far has materially elucidated the mystery of the etiology and pathology of the disease. These writers for the most part looked upon micro-organisms with a mental magnification borrowed from the high contagionist craze of the day. For them the bacterium was the primal factor in the disease. Naturally this left the atrophic bone-change even more completely unprovided for than did the subsequent sinus theory of

Gruenwald and his followers, to which I have referred as starting with Michel. Fraenkel divided nasal catarrhs into hyperplastic and atrophic, regarding the latter as a sequel of the former. He also admitted the influence of various dyscrasiae as etiological factors. More than thirty years later he had the satisfaction of reminding25 his colleagues that this early classification is fundamentally to-day the basis of differentiation of intra-nasal inflammations. In 1879 Eugen Fraenkel²⁶ studied sections of the atrophic nasal mucosa under the microscope and noted changes in the epithelium, though he asserted that it is destroyed and replaced by other cells. He remarked on the few acinous glands to be observed. He believed there was always an underlying dyscrasia of tuberculosis or of syphilis. He believed there were always deep lesions of the mucosa and of the bone. In the same year Gottstein,27 though believing in its systemic nature, recognized ozena as a constant symptom of that stage of a chronic rhinitis in which it has come to an atrophy of the mucosa and the glands in it. The vitiation of the secretions from this cause he proposed to treat by the use of intra-nasal tampons of cotton left in the nose for twenty-four hours or more. Hermann Krause, 28 in 1881, described microscopic appearances in two cases of ozena and noted the presence of evidences of fat and fatty acids in the secretions of the mucosa, fibrosis of the stroma and blood vessels, and the relative increase of lymphoid cells. The destruction of glands he believed to be due to limitation of the blood-supply and the fibrosis of the blood vessels. These ideas were many of them introduced in America by Bosworth in several excellent papers.²⁹ in 1882, and in his "Treatise of the Diseases of the Nose and Throat." He believed atrophic rhinitis with ozena was usually the sequence of a purulent rhinitis in childhood. Bruegelmann,30 in 1884, looked upon the nature of ozena as a suppuration of the nasal turbinated bones. He thought the increased dimensions of the nasal chambers an anomaly of development, and he believed that this and a scrofulous diathesis are predisposing factors in the etiology.

Zuckerkandl brought the discussion to its more useful channels in refuting the fallacies of the theories dependent on a congenital bone-defect or abnormality, and in suggesting that the changes in the bone are apparently the result of an intra-vitam inflammatory process, but it was a number of years before this view became the prevailing one. Many papers were written in support of the view that it is due to a congenital conformation of the nasal fossae. These are reviewed in the paper of Meisser (1, c,) and the later one

of Alexander. The paper of Cholewa and Cordes³¹ is to be mentioned as claiming that the essential lesion is a bone lesion, but a peculiar one, not of an inflammatory nature. As for the changes observed in the mucous membrane itself, these have been variously described as primary and as secondary to a bone lesion by numerous observers, among whom we may name Habermann⁵² in 1886, Schoenemann³³ in 1902, Oppikofer³⁴ in 1907 as representative of opinions expressed at isolated times. The whole question is exhaustively reviewed by Alexander.³⁵

John N. Mackenzie, 30 in 1884, expressed the belief that there is always a hypertrophic stage to atrophic rhinitis. Moure 37 declared himself a sharer in the belief of Gottstein that the essential lesion in atrophic rhinitis lies in the glands. Habermann (l. c.) also accepted this view. The involvement of the serous and mucous glands is well established in present-day nasal histology, but it has never been generally accepted as a satisfactory exposition of the whole process or of its etiology.

Luc⁵⁸ and Bronner,³⁹ in 1887-8, again drew attention to the apparent association of ozena and accessory sinus disease. Gruenwald⁴⁰ advocated this idea in his book on nasal suppuration, and that other lesions also were the cause of it, such as adenoid vegetation, etc. Luc,⁴¹ in 1888, reported three cases of tracheal ozena, and a discussion as to priority in the observation of the affection arose with Massei. Zarniko⁴² and others asserted that tracheal ozena may exist without a nasal lesion. Potiquet⁴⁸ contributed a number of papers to the earlier discussions of atrophic rhinitis by modern rhinologists.

I have already referred to the literature of the microbian theories of the etiology of ozena. The similarity of the bacillus found by Loewenberg, Abel and Paulsen in ozenatous cases with the bacillus of Frisch, and of both with the bacillus of Friedlaender led to much discussion as to the connection of ozena, scleroma and pneumonia. While most observers confirmed the early reports of various bacterial forms found in the secretions of ozena, no one was able to demonstrate the presence of any of them in the subepithelial tissue of the mucosa itself and some of the reputed specific forms were found in normal noses or in noses not the site of atrophic rhinitis. Perez⁴⁵ not only discovered a cocco-bacillus as the cause of ozena, but found it also in a dog, and, injected into rabbits, it caused gradual atrophy of the turbinated bones. He suggests that it is acquired by man from the dog. Hajek⁴⁶ who made investigations on the bacterial contents of the nose, expressed

his belief that the organisms found in ozenatous cases had little or nothing to do with the etiology of the disease. He believed that atrophic rhinitis had always a preliminary stage of hypertrophy. In the discussion on his paper, in 1887, in which he asserted this and that the Friedlaender bacillus often found in the nose played a secondary part even in pneumonia, he was opposed by Weichselbaum, Paltauf and Roth.

Siebenmann,⁴⁷ who was a collaborator with Meisser in the examination of cranial form as a factor in the etiology of ozena, made a careful study of the histology of atrophic rhinitis, but he, as many other writers, laid a stress upon the specificity of the metaplasia of the epithelium of the surface which would not have been the case if such work had been controlled sufficiently by the examination of this element in normal noses and in other pathological conditions, since in adult life there is always much of it to be noted. Cozzolino⁴⁸ believed the lesion first begins as a keratosis of the surface epithelium and becomes secondarily bone disease. There was a tendency with many others, as with Rethi⁴⁰ for example, to consider the ozena as something specific and aside from the anatomical lesions of atrophic rhinitis.

I have noted that from time to time authors had incidentally remarked on the connection of tuberculosis and ozena, owing to their having a common basis in malnutrition. Theisen,50 in 1904, made it the subject of a paper. Broeckaert on tributed to the study of its histology the expression of his opinion that the disease was due to a toxin produced by a parasyphilitic or a paratuberculous systemic infection. These terms came into use about this time, and their exact pathological significance is still enshrouded in mystery. Frese⁵² was of the opinion that most of the cases are of syphilitic origin. Sobernheim, 53 in 1909, reported that seventeen cases of typical ozena gave a negative Wassermann reaction, adding another proof to the view that the nasal affection may exist without any syphilitic antecedent. A number of others testified to the same effect. It was spoken of as a larval tuberculosis. 54 Schoenemann,55 in 1909, traced a connection between the occurrence of eczema and that of ozena. From time to time various authors have suggested that ozena is a trophoneurosis.56

Freitel⁸⁷ made an attempt to determine the age at which ozena first shows itself and concluded that in the great majority of cases it was in the school age of children that it developed, 4 to 14 years. In all treatises on the subject since the affection was first differ-

entiated by B. Fraenkel, the preponderance of the female sex in the cases affected by it was noted.

The treatment of atrophic rhinitis, especially of its chief symptom, ozena, has been varied. Going back to the time of its differentiation, we have already noted that tampons were recommended by Gottstein, and in the earlier history of rhinology this was a common form of treatment for all nasal affections, the linen or other absorbent tampon being saturated with various medicaments. Cauterization, we have seen, was also recommended by the ancients for what they called ozena, and in 1884-5 it was recommended⁵⁸ again as a therapeutic agent in its modern differentiation. In most of the writers on the subject recommendation for treatment included thorough cleansing and the application subsequently of some stimulating medicament, like thymol, aristol, turpentine, ichthyol, etc. Braun, Laker and Demme⁵⁹ recommended (1891) vibratory massage. This was employed by others either by hand or by electrically driven machinery. Faradism was also used,60 also the electrolytic application of chlorid of copper⁶¹ and submucous electrolysis.62 Dionisio63 employed various forms of photo-therapy in ozena and in the same year (1903) Casassa⁶⁴ reported on the therapeutical use of radium.

Brindel⁶⁵ in 1902 inaugurated the treatment of ozena by the injection of paraffin under the atrophied mucosa and this method of treatment has persisted to the present time, it being strongly recommended by Hutter66 ten years later. Broeckaert,67 who adopted the idea promptly, subsequently supplemented it by more vigorous measures. It was practiced by Fliess68 and by many other rhinologists for a time after this, until the report of an embolus of the retinal artery in two or three cases of the injection of paraffin in the skin of the nose discouraged for a while frequent resort to it. On the strength of his belief that atrophic rhinitis with ozena was the result of a disease of those cavities, Broeckaert,69 in 1905, in addition to the use of paraffin proposed to operate radically on the ethmoidal sinuses and to curette the sphenoid. He removed the middle turbinate, allowing the inferior to remain, reinforcing it with paraffin injections and injections of it also into the septal walls and floor of the nose. He proposed also to destroy the nasosinusal wall of the antrum, but not to curette the latter unless it was diseased. He claimed the injection of paraffin was efficient not only as a prothesis filling out the large spaces, but as a stimulant modifying the nutrition of the mucosa. Guyot70 employed suction of the nasal chambers by mechanical methods in the treatment of ozena. A number of cases were treated with injection of antidiphthertic serum because diphtheroid bacilli were found in the crusts chiefly by Italians.⁷¹ Skillern and Holmes⁷² used vaccines made from the pure culture of the Abel bacillus. Emulsions of the culture of the lactic acid bacillus have been used by many in the treatment of ozena.⁷⁴ Foy,⁷⁵ in 1911, claimed considerable benefit can be attained by the patients being taught to breathe persistently and properly through the nose. Ozena has been treated with hot air, dry or moist.⁷⁶

In the January number of Semon's Centralblatt fuer Laryngologie, 1912, there is a very valuable review of the literature of ozena during the years 1909, 1910, 1911, by Alexander. Among the points to which he gives prominence is the inequality in the distribution of cases geographically, racially and socially, its incidences as to sex and age. He drew attention to the fact that while the Wassermann reaction in his own experience and in that of others had given negative results in cases of ozena, he had himself seen a typical case of ozena, the offspring of a syphilitic father, the sister of a congenitally syphilitic brother, and in her case the Wassermann reaction was also negative. He also drew attention to the fact that while ozenatous subjects rarely contract syphilis, such cases have been reported by Fraenkel and Sobernheim (1. c.) and others, and that the question of the relationship of true ozena to syphilis is not by any means settled. It may be remarked that the subject is much embarrassed by the confusion which still reigns as to the clinical differentiation of the cases. With syphilitic ozena on the one hand and atrophic rhinitis on the other, without crusts or odor, it is difficult for an author to keep constantly in view the typical cases of atrophic rhinitis with ozena. The confusion is increased by the introduction of the consideration of accessory sinus disease attended by intra-nasal crust formation. In this excellent review it can be plainly seen that with the exception of the therapy, which is always new, optimistic and futile, there has been scarcely a question raised in the literature of the subject during the three-year period with which it is concerned that had not been thoroughly discussed in the former three decades in discussions of the phenomena presented by ozena.

ETIOLOGY.

Most modern observers who have devoted themselves to the histology of the lesions of atrophic rhinitis believe it is primarily a bone disease. In the consideration of the etiology various predisposing factors have been urged, some of them with considerable plausibility, others with none. General systemic malnutrition in children, sometimes dependent on syphilis, seems warranted from the number of cases observable in this class often seen in two or three children of the same parents. Sex quite evidentally is a determining factor, as a very large majority of the cases occur in females. Puberty also is clinically observed to have a determining influence on the advent of the symptoms.

These factors are observable in the apparent etiology of those cases of chronic rhinitis with crust-formation and the typical ozenic odor. In regard to the latter, while we speak of a typical ozenic odor it seems probable, from the state of opinion as to the bacteriology of the disease, that there is no specificity about it. Large numbers of bacterial forms, swarming in a lipo-proteid excretion of the mucous surfaces, set up chemical changes in which the volatile and non-volatile fat derivatives are concerned, which give rise to the odor.

While space forbids a discussion of the many theories advanced in regard to the etiology, it may be well to say that syphilis, long regarded as an etiological factor from the point of view of heredity has recently been investigated in its relationship to ozena by the Wassermann reaction. Negative results were almost uniformly obtained when complement fixation was tested for in the serum of the blood of ozenatous subjects. How far this can be regarded as conclusive in negation of the idea of a syphilitic hereditary factor in the etiology of true ozena it is too early yet to decide.

Excluding the cases of active tertiary nasal syphilis, as we do in modern rhinology in speaking of ozena, there is little warrant for the belief that hereditary syphilis has more to do with the etiology of atrophic rhinitis than that the syphilitic dyscrasia, like the tuberculous dyscrasia, is the cause of a lowered state of general vitality. Like tuberculosis, atrophic rhinitis is the disease of poverty. It occurs in the well-to-do just as phthisis does, but it is a disease of malnutrition, the usual cause of which, as we know, is poverty.

There is an affiliation of atrophic rhinitis with accessory sinus disease by virtue of the fact that the process itself occasionally extends to the mucosa of these cavities. There are also certain cases in which a chronic discharge from the posterior ethmoidal and sphenoidal sinuses exists with crust formation. In the former category of cases surgical treatment of the sinus accomplishes nothing, in the latter category of cases eradication of the sinus affection cures the ozena. In the majority of cases of atrophic

rhinitis with ozena the sinuses are not involved in any way, even in advanced stages. Frequently the openings of the sphenoidal sinus can be perceived by anterior rhinoscopy, owing to advanced atrophy, and the mucous membrane may be seen to be free of crust or other discharge.

Atrophic rhinitis sometimes exists in one nostril, when there is marked deviation of the septum. The concavity on the one side shows abundant crusts and an atrophic mucosa. Straightening of the septum regularly cures the condition. Atrophic rhinitis not infrequently follows extensive operative destruction of intra-nasal structure. These undisputed phenomena lend some plausibility to the theories and observations advancing, as an etiological predisposing factor, the congenital roominess of the nasal chambers. The arguments and facts usually adduced in support of such theories have not sufficed to convince the majority of rhinological observers of their tenability. Finally a certain amount of atrophy, without crusts, is the physiological accompaniment of old age. There is plainly a shrinking of both bone and mucosa.

There is hardly any histological lesion which could serve as a common cause for changes in the mucosa of all these cases except that of a bone lesion which has interfered with the nutrition of the soft parts. The bone itself is affected in them all, and while there is no satisfactory evidence in the bone itself of inflammatory action, the process is manifestly associated with a pre-existing chronic inflammation of the mucosa in a sufficient number to suppose that in these at least the bone atrophy is due to it. An analagous bone lesion may be supposed to exist in the other cases. It must be confessed, after all is said, that the etiology and even the succession of histological changes is far from satisfactorily understood or accurately known.

PATHOLOGY.

In this form of nasal inflammation the epithelial metaplasia is more marked than in the hypertrophic form and it is constantly present. Even in fairly normal nasal chambers the cylindrical epithelium is in places frequently replaced by flattened cells. In atrophic rhinitis this is universal. Yet so far as I know there is no stickle cell-formation such as is sometimes seen in the epithelial metaplasia of other morbid processes. There is a tendency to cornification of the surface layers,

There is beneath the epithelium an infiltration of the stroma with a relatively much increased number of round cells. These are marked around the ducts of the acinous glands. There is a

steady encroachment on the epithelial structures of the glands by these round cells and a lowly organized fibrous connective tissue which finally all but destroys all traces of glandular structure. The same may be said for the blood vessels. Whether cavernous sinuses in these cases have ever been much developed at puberty or not is a question. At any rate the blood vessel walls have been to a large extent obliterated by the fibrous and the round-cell infiltration. That in this process of cell degeneration there is the production of considerable fatty detritus is probably true, but to the extent one would infer from the accounts of some observers is certainly not my experience. This proteid decomposition evidently finds its way to the surface with the copious discharge of serum which takes the place of the normal viscid fluid of the glands, and there its rapid evaporation leaves behind in the form of crusts a lipoid proteid precipitate which rapidly ferments and is split up into fatty acids by various bacteria. A large number of these have been found and several have been described as specific in the disease, but neither the bacilli of Loewenberg, Perez, Pes-Gradenigo, nor the diphtheroid bacillus, all of which have been urged as etiological factors, have been accepted as of any significance in the causation of the lesions. It seems probable that in the sense that there is an antecedent hyperplasia of the periosteum in atrophic rhinitis, we may say that hypertrophy is followed by atrophy in certain cases of nasal inflammation, but it seems quite certain that while this pre-existing periosteal hyperplasia may be present in the larger number of cases of typical atrophic rhinitis with ozena, this is the only element in the mucosa which is affected by preliminary hyperplasia. That this is always affected primarily must also be acknowledged as more or less hypothetical. Nevertheless the most significant change in structure is the thickening of the periosteal layer. Inasmuch as the distribution of nutrient arteries to bone and to mucosa lie in this element of the mucosa, inasmuch as it seems to be a fibrosis which ultimately destroys the glands and the blood vessels of the mucosa itself, it is a fair conjecture that it is in the periosteum and the perichondrium-for the septal cartilage also becomes thin and even in places absorbed-we must seek for the root of the changes which give this nasal disease unique characteristics.

The histological features of the disease seem to justify us in calling it a fibrosis, but the clinical features which accompany them justify us rather in calling it a mystery. There is no analogue to it elsewhere in the body. This gives us a clue to its essential na-

ture. There is no other region in the body where we have a very thin plate of bone covered on both sides by a vascular secreting mucous membrane and separated from the bone on each side by a thin layer of periosteum which carries its nutrient blood-vessels. Often present in early childhood, associated with puberty in women, the symptoms ceasing for the most part after middle life, not beginning, except in the rarest cases, after adolescence, apparently not necessarily preceded by a condition of chronic inflammation or by hypertrophy, conceiving of it as initially a fibrosis of the layers of connective tissue next the bone and cartilage is a matter of some difficulty,—yet, after all, that seems the most reasonable hypothesis purely from a histological standpoint.

In order to understand the essential lesions of the stroma of the mucous membrane in atrophic rhinitis, I must repeat somewhat the remarks I have made in a recent series of articles on the con-

tractile elements in the connective tissue.

Looking for the first time at the picture presented by sections of the nasal mucosa of animals, stained by the Weigert formula or one of its modifications, the observer is struck with the abundance of elastic fibers. Their profusion at first seems not to be more pronounced, on the average, in one locality than in another, but it soon becomes evident that, aside from their great abundance in the walls of the large blood-vessels, the most constant and the most richly supplied locality is the periosteum and the deeper layers of the stroma intimately associated with it. Thick interlacing bundles are always demonstrable, running, in an irregular way, parallel with the planes of the bone. Everywhere the blue-black threads run through the middle layers of the stroma, always either parallel or obliquely to the surface. Nearly always demonstrable is a special layer of fibers situated in the stroma just under the epithelium at varying distances from it, but in such relation to it and in such arrangement that one cannot fail to perceive that it subserves a special physiological need, somewhat apart from the general tonicity the widely scattered fibers elsewhere would give the mucosa.

The persistence of this layer of wavy fibers just under the epithelial line is not infrequently noted in a mucosa considerably altered by hypertrophy. It is a layer indefinite in extent and somewhat inconstantly seen in the normal mucosa in the human infant and in animals. It is well to draw attention to the fact that never in the free stroma do the elastic fibers run in planes vertical to the surface or vertical to the periosteum, but always obliquely to them, except for the sub-epithelial fibers just spoken of, and the elastic

fibers of the periosteum itself which run in more or less horizontal directions in relation to the surface and the bone.

Recently an article by Duerck⁷⁸ has drawn attention to straight telegraph-wire like fibers revealed in connective tissue generally and in arterial walls by some of the Weigert stains for nerve sheath demonstrations. He seems to think these had not been previously demonstrated in the walls of the arteries. While they may not have been especially emphasized in the work of Koelliker and Ebner, from which he quotes, they certainly are a more or less familiar phenomenon to histologists and may be demonstrated with the hemotoxylon-resorcin stain as modified by Hart. It is not unusual to see these fibers, or fibers at least morphologically similar to them, in the connective tissue of turbinated bodies of infants, and they are seen also in those of the monkey.

Breugelman⁷⁰ who used the 'hemotoxylon eisenlack', stain for sections of the penis also demonstrated them there. We may imagine they furnish in the walls of the arteries and elsewhere that form of elasticity lent to a lady's corset by the whalebone stays, but it is not at all certain that their straightness, their "telegraph wire" appearance may not be due to their being ordinary elastic wavy fibers stretched out straight by traction or by virtue of their position.

The distribution of elastic tissue around the gland acini is not very marked, or apparently in such a mechanical arrangement as to work in the most efficient manner in expelling the contents. While it is true that in some cases it is demonstrable in the material from animals, such is not uniformly the case. One gains the impression that such expulsion of mucus from the glands as may occur from the contractile action of the tissues, arises more from the general elasticity of the stroma than from a special network around the glands. Although the description of Schiefferdecker⁸⁰ is not very accurate, it seems to me, I repeat what he says. Backward from the vestibuli nasi "with the beginning of the glands, the elastic fibers, especially in the deeper parts of the stroma, become more slender, but are nevertheless still thick; they surround the glands and, singular to say, reach a greater thickness exactly at those places which lie between the epithelium and the glands, so that this part appears as the characteristic continuation of the network hitherto penetrating the whole stroma."* Now while this may be

^{*}Schiefferdecker has had the same experience with the apparent capriclousness of elastic tissue stains, and he also is not disposed to trust the results of tinctorial reactions. It seems to me we are justified in supposing that there are variations of chemical and tinctorial reactions which do not influence elasticity, but it is also possible that a functional demand may temporarily effect a chemical and hence a tinctorial change and also

the character of the elastic fiber arrangement bordering on the vestibule, in the deeper portions of the nose such is not the case. The same author subsequently speaks of the glands of the deeper parts of the nose being surrounded by a membrana propria. It is true, as will subsequently appear in a discussion of pathological conditions, that one can observe appearances, as if the base of the gland-cells exuded a homogeneous substance which forms a sort of an incomplete and irregular hull to a gland acinus; but it is very difficult to be sure that this, in the material from animals, is not simply a slightly more dense arrangement of connective-tissue fibrils. Among these, as I have said, may frequently be traced the elastic fiber of the stroma, but there is no specific peri-glandular network of fibers taking the Weigert stain, nor is there anything which can be called a membrana propria.

In the walls of the nasal blood-vessels I am not aware there is any exceptional feature to the distribution of the elastic fiber. In the endothelium of the single-walled capillary the occasional appearance of a purple stain may be thought to argue for an elasticity which is more evident, judging from the stains, as the thickness of the walls increases. The intima of the venous sinuses is very thick, and the longitudinal elastic fibers always stand out as sharp landmarks in sections of the erectile tissue colored with Weigert's stain. It also mingles freely with the external coats of the venous sinuses. The arterial vessels present no especial feature in this regard.

What I wish to dwell on especially is the condition of the elastic fiber itself in the presumably normal material, as distinguished from the elastic fiber and the elastin noted in the material from the nasal mucosa of adults removed in the course of clinical work. Normally the elastic fiber is indefinitely long, slender, branching, usually with finely drawn-out ends interlacing everywhere with other fibers. Just where and how they are anchored to other cells is not very clear. The transverse measurement of the elastic fiber varies greatly in different localities. In the nasal mucosa it is of smaller caliber as seen in the infant and in the monkey. It ranges from a hardly perceptible line, as viewed with the o. im. 1/12 obj., up to perhaps two microns. Koelliker, speaking of the elastic

a change in elasticity. In other words, elasticity being an expression of energy, it may vary in the tissues, just as muscular energy varies without betraying itself in structure to our powers of vision. This falls in very well with a recent remark of von Hansemann (Deszendenz und Pathologie, Berlin, 1909) whose ideas on the mutability of tissue-form for more than a decade have been known under the name of "anaplasia." "In man slightly differentiated connective tissue is extraordinarily variable in its occurrence and everywhere adapts itself in form and position to temporary demands made by normal and pathological states."

fiber in general, says it ranges up to six microns in diameter or even to twice or thrice that. In the nose when it exceeds two or three microns it is usually associated in the loose stroma with pathological conditions and itself presents various departures from what I conceive is its normal condition. In my notes I have spoken of this normal condition as "efficient looking," meaning thereby they were arranged in such a way as, supposing they were capable of contraction, their shortening would lead to a condensation of the tissues in which they lie. This was to distinguish them from swollen fibers with abrupt ends, broken into sections, granular, sometimes betraving their former state of continuity only by a row of granules into which they had disintegrated in the course of disease,—perhaps at times they break up into this state of discontinuity as a result of the technic of fixation, hardening and staining. Great clouds of elastin granules are thus seen crowding some fields. In the normal mucosa when such clouds exist they are more or less homogeneous, the granules for the most part not being resolved by the highest powers of the microscope.

So far as my own convictions go, there can scarcely be a doubt of the origin of the elastin and the elastic fiber as an exudate of the cells in adult tissue, even when the fiber is efficient looking. In normal tissue it is organized into a fiber by a precisely working machine, but when the stimulus is over-great, as in hypertrophic conditions, the fibers are thick and swollen, with abrupt ends, often broken into sections or a row of granules, but frequently existing as a cloud of coarsely granular material in the stroma. Such granules are seen inside of cells, especially at the free surface of gland cells. Up to a certain point this disorderly condition of the elastin corresponds to the extent and the degree of the hypertrophy, and then a change sets in.

I cannot here enter into an exhaustive discussion of all the changes in the nasal mucosa supervening upon an hypertrophic rhinitis. I must, however, trace in outline the course of events which can be gathered only from a composite mental impression of the moving picture of morbid processes after years of observation. The static conditions conventionally looked upon as the "pathology" of disease is a sterile way of studying vital problems. Morbid tissue, like normal tissue, is a living thing, moving along the path in which it is guided by the laws of living matter and by, in this locality, the preponderating influence of the environment. At hardly any given moment is the condition exactly what it subsequently becomes. The only constant thing is change. I am com-

pelled then, in attempting to place the changes in the so-called elastin in the proper light, to be a little discursive. There is a growing tendency, for which we must be profoundly grateful, to treat of pathology not as something dead and immovable, but as of something living and mobile, a process and not a state. In chronic inflammation of the nasal mucosa the static conception of it is entirely unintelligible. We must conceive of it as a process in which changes are slowly advancing as the result of age, heredity and environment.

There may be changes in the nasal mucosa as the result of a chronic rhinitis which has not perceptibly increased or diminished the bulk of the tissue. Hypertrophy and atrophy are gross and inexact terms, but they are so fixed in rhinological usage that it is impossible, at least inconvenient, to break away from them. So notwithstanding the protest I make in what I have to say it will be more convenient to start from a basis furnished by some of the conventional divisions of atrophic rhinitis, of no value in themselves except as indicating some of the causes underlying the process.

It often happens that atrophy supervenes upon states of the mucosa whose condition of chronic inflammation has caused symptoms so trifling as not to betray it. It is occasionally the case that edematous polypi (especially in asthmatic and hay-fever cases) spring from a mucosa in which previous inflammatory changes have been insignificant, and the same may be said of atrophic rhinitis. Nevertheless it is true that a periosteal lesion without any antecedent hypertrophy of the mucosa may be the first step in the pathological process which leads to an atrophic rhinitis. Such is a fact, I believe, in those ozenic cases, not too common now that a keener differentiation of diagnosis is exercised, which we recognize as having begun in early childhood, when there may have been a half-suppressed syphilitic inheritance, or some other systemic deep-lying vice. This also frequently applies to those cases whose symptoms of ozena, with the characteristic crusts and odor, date back to puberty only. There is another class of cases, pseudo-ozenic we may call them, which have foul decomposing crusts without the specific odor, and associated with sinus suppuration. In both these categories there is an antecedent periosteal lesion. In the first, the true ozenic cases, there is a periosteal lesion due to some unknown systemic cause which has blocked the nutrient arteries of the superjacent soft parts. Such is also the condition mutatis mutandis in the other category just mentioned. The suppurative inflammation of the mucosa of the sinuses has spread through the periosteum to the bone. One bone change we may say is endogenic, the other is exogenic, and the results (true ozena and pseudo-ozena) may be differentiated by careful clinical observation. There is still a third class of atrophy in addition to that succeeding hypertrophy. I refer to the atrophy of age. The bone shrinks, the epithelium is atypical, the venous sinuses are fewer and smaller, the racemose mucous glands are suppressed, while from the single-tubed serous glands of Bowman in the upper regions of the nose and from direct transudation a watery fluid flows and drips, often so inopportunely, from the nose of age.

There is always some edema or serous infiltration accompanying atrophy even in the very last stages. In the end the connective tissue cells have taken on an embryonic type with branching processes, and such mesh of fibrils as still exist is crowded with the small leucocytes and their naked nuclei. At this stage the elastic tissue in the walls of the radical arteries and veins, even that of the intima, has become disorganized and partially absorbed. The glands, all but perhaps some traces of their ducts, have disappeared and the stroma of the turbinates is little better than granulation tissue.

To summarize then: In the newborn infant the elastin material exists in the nasal mucosa, so far as selective stains reveal its presence, in the form of a fine net-work of fiber and no coarse granular material or swollen fibers. Later in life the latter appear and in hypertrophy are prominent in the landscape of the sections. As changes go on to atrophy of any kind or to edema, the useless non-efficient material is absorbed first and the fine fibers last, perhaps themselves passing through a stage of disorganization. I think there can be no doubt that in adult tissue the granular elastin has an intra-cellular origin, and it is probable that even some of it thrown out in inflammation may be organized into efficient fibers, but for the most part this attempt at organization is incomplete and imperfect. Like the callus thrown out from bone, it must be looked upon as a process of repair and regeneration. The material carries with it imperfectly the heredity of early embryonic life, the tendency to tissue-formation. It is quite impossible to account for the appearances on the supposition that all the disorganized material has had its origin in the degeneration of pre-existing normal fibrils.

In taking up the question of the presence of the smooth muscle cell in the stroma of the nasal mucosa, so interesting from many points of view of a general nature, the special histological questions concerning it have hitherto aroused interest only in one respect. Is it a fact that separate smooth muscle cells or limited bundles of cells lie free in the loose stroma of the erectile tissue of the turbinate bodies, or are they always closely connected with the coats of the large blood-vessels? Zuckerkandl^{\$1} and Herzfeld^{\$2} maintain the latter view, and their position may be regarded as summed up in the words of Herzfeld: "The erectile tissue of the nasal mucosa is rich in organic musculature. This, however, does not lie free in the connective tissue of the erectile bodies, but forms as in all other parts of the body the middle tunic of the arteries and veins, and lies closely pressed around the walls of the lacunae of the erectile tissue."

Students of rhinology became familiar with the view of Zuckerkandl, which is of the same tenor, many years ago. While muscle cells had been described in the stroma of erectile tissue elsewhere, the corpus cavernosum of the penis, the nipples, etc., the scalp, the skin of many animals, for many years no one ventured to assert in the face of Zuckerkandl's authority their presence in the stroma of the nasal erectile bodies. I had been indisposed to accept the views of Zuckerkandl chiefly for physiological reasons and from the clinical study of the nasal mucosa. Owing to the difficulties of differentiation and the unsatisfactory technic in vogue before Mallory's recent introduction of his connective tissue stains have added so much to the more exact study of cellular relations, it was difficult to acquire sufficient assurance to refuse an assent to an authority so weighty as that of Zuckerkandl. It is true that Schiefferdecker⁸³ has asserted of late years that muscle fibers do lie free in the stroma, but the confirmation of the assertion was a difficult matter, and it still remains a disputable matter. The difficulties are not wholly technical nor entirely those of personal opinion, but, in the question are involved some fundamental principles of histology, of embryogenesis and of other matters of by no means inconsiderable interest in general biology.

The relation of the smooth muscle cell to the racemose glands in the nasal mucosa differs somewhat from that which obtains in the skin since, according to Koelliker, in the connective tissue net-work around the skin glands, there is mingled with it elastic fibers, fat cells and often muscle cells. It is true that muscle cells can often be made out in connection with the racemose glands of the mucosa, but in health with regularity only around the ducts of the glands, and here they are seen even closer up under the sur-

face epithelium at their mouths,—the only situation immediately under the surface epithelium, so far as I have been able to observe, where the muscle cell can be demonstrated in the nasal mucosa. We usually have the mouth of the duct at the bottom of a deep sulcus in the mucosa, so that the muscle cell as a matter of fact does not even here usually approach very closely to the surface. Further it may be noted in this connection that frequently bloodvessels of considerable caliber (fifty microns estimated in one observation in my notes) have no encircling muscle coat when they lie close under the surface epithelium. It will be remembered that I described as normally existing close under the epithelium a special horizontal layer of elastic fibers, and we may readily believe that these are more serviceable in obtaining a smooth surface on contraction than muscle fibers would be in that situation, while deeper in the stroma a musculature is required to supplement the obliquely arranged elastic fibers. For efficiency in respiration and in olfaction a smooth nasal surface would be very desirable, but for proper drainage it is imperative. I shall not attempt a complete description of the musculature of the blood-vessels further than to say the deep veins and sinuses and deep vessels of even very small caliber are supplied with well-developed muscle cells in their coats, both longitudinal and transverse; in the superficial vessels, as I have just intimated, the character of the coats is that of large and small capillaries.

One cannot have constantly before one's eyes the difficulty of distinguishing the indifferent cell from the differentiated muscle cell in the connective tissue without the growth of a conviction that out of the former may arise the latter in answer to some functional demand, increasing in importance as one approaches the vascular layers. In another respect it may quite as rationally, even from my observations, be argued that the muscle cells have split off primarily from those of the vessel coats, by mitosis, in the development of the bulk of the erectile bodies which takes place at puberty. This might easily occur and the muscle cells might be isolated at considerable distances by the proliferation and interposition of the different connective tissue cells of the loose stroma. In the calf, and in the human infant before birth, especially in the latter where the embryonic type of cell prevails, the isolation of the muscle cell, if I am to trust my own notes, is even more conclusively to be observed than in the human adult. To be sure there is no reason why the genesis of the stroma muscle cells may not be ascribed to both sources, i. e., to their original embryonic differentiation in the tissue and to their derivation under certain conditions from the musculature of the blood vessels. The question of the mutation of the indifferent adult connective tissue cell into a muscle cell is quite another matter, and will find little support from some observers. Nevertheless, while I admit that my observations are susceptible of an orthodox interpretation in this instance, I am disposed to exclude the possibility of such a metamorphosis, especially in the disturbances of chronic inflammation. In other articles85 I have dwelt sufficiently upon the evidence of a metamorphosis of epithelial cells into cells exhibiting the fibrils of connective tissue under the stimuli of chronic inflammation. Here, as in the tonsils, chronic inflammation certainly induces an appearance of metaplasia which has forced itself on my attention. The branching connective tissue cell is much more closely related embryologically to the muscle cell than to the epithelial cell, and how much resistance this view of their functional and morphological mutability may receive I do not know.

This brings me to the fate of the smooth muscle-cell in plainly pathological states of the nasal mucosa. I have explained at great length the difficulty one must experience in saying where normal nasal structure in the adult becomes abnormal. A very wide neutral territory must be pictured as existing between the two. With the elastic tissue we have seen that when we emerge out of that neutral debatable strip into the clearly pathological domains of edematous infiltration and of atrophic change, we have found a very marked diminution not only in the efficient coaptation of the elastic granules and the configuration of the fibers which occurs early in the course of hyperplastic change, but we have found a marked diminution in the quantity of elastir, organized and disorganized, everywhere in the tissue. Clinically, in the viscid mucus which clogs the gland acini in atrophic rhinitis, we recognize an increased demand for the function of an actively contracting cell around the acinus. Comparing sections differently stained of the same tissue in atrophic rhinitis we at once note in the penultimate stage that the muscle cells have offered a markedly greater resistance to degeneration and absorption than has the elastic fiber. I have pointed out that in the normal tissue the smooth muscle cell, or something resembling it, is seen around the mouth of the racemose gland ducts but not around the acinus. In the primary changes in the glands in the course of chronic hypertrophy the muscle cell is noted also wrapped around the acini in such a way as to suggest that it is there in answer to a functional demand for the expulsion of a

thickened mucus, or possibly to take the place of the elastic tissue which has ceased in the stroma to transmit its pressure to the glandular structures. Passing on to fairly well advanced atrophic conditions, stages in which there has been marked destruction of the venous sinuses and the glands by the encroachment of low-grade fibrous tissue and the obliteration of these structures, we note that the muscle cell in the walls of the arterioles and venous sinuses most affected is assuming the irregular nucleus form and branching cell body of the indifferent connective tissue cell. At least, from my point of view this is what seems to take place, though I cannot deny the validity of the description which narrates the history of the process in another fashion, viz., that this indifferent connective tissue cell replaces the muscle cell.

A careful study of the cell forms in the stroma of these moderately advanced cases of atrophy in comparison with hypertrophy will reveal comparatively very many more cells, entirely isolated from the neighborhood of any blood-vessel, which have assumed or preserved the morphology of the smooth muscle cell than in normal or hypertrophic mucosa. It is true, a perfect picture of the muscle cell form is not obtained in the technic I have used, and the criticism is unavoidable that pressure has moulded indifferent connective tissue cells into the rounded ribbon or spindle-like form of the muscle cell with a cylindrical nucleus; but I am sure if they were wound around a blood-vessel there would be no hesitation on the part of any histologist in classifying them as smooth muscle cells. In the later or last stage of atrophy of the mucosa all muscle cell forms have disappeared, the stroma has been reduced almost to the condition of granulation tissue made up of round cells in a feeble mesh of star-shaped branching cells with long processes. resembling the embryonic type of cell, and numbers of singlewalled capillaries.

The structural changes wrought in the mucosa are evidenced in the vitiation of the secretions. The absorption of bone and cartilage are responsible for a change in the external configuration of the nose when the disease has begun in early childhood, before the facial bones are fully developed. Whether it has begun in childhood or at puberty, the roominess of the nasal chambers is dependent upon atrophy of the scroll bones and of the mucosa covering them.

How to account for the disappearance of the crusts and the secretions in those cases in which it occurs after middle life, remains a subject for histological research. A restoration of the glands and

blood-vessels anatomically seems biologically improbable, yet there is a return to a secretion on the surface of such a nature that its evaporation is not rapid enough to prevent it from carrying away with it those non-volatile ingredients which formerly were left behind as crusts of dried secretion.

The atrophy of age is of the same structural nature, so far as the glands and blood-vessels and the periosteum are concerned, and it seems probable that in those cases which recover from their terrible affliction of foul-smelling nasal crusts, the senile stage of the mucosa is reached and its condition suffices to remove the trouble. In this view then we may believe that a fibrosis of unknown origin in the periosteum and perichondrium induces, by shutting off the proper nutrition of the tissues, a state of vicious lipoid-proteid metabolism in the mucosa, the waste products of which washed out with the serum and lymph of the tissues produce the crusts on the surface. These vary with the concentration of the solid constituents of the secretions. Sometimes they are not sufficiently concentrated to remain as a deposit on the surface. We may thus account for cases of atrophy without crusts or excessive odor. The approach of age slows down the activity of all metabolic processes and tends thus automatically to cure the ozena of atrophic rhinitis and leave behind only the structural atrophy. I am fully aware, at the present state of our knowledge, how likely this hypothesis is to prove insufficient on critical analysis or even erroneous when more complete objective knowledge is attained.

To summarize the histological pathology of atrophic rhinitis, we may say that owing either to antecedent intra-nasal inflammation, or to a constitutional dyscrasia, or to the physiological change of age, or to all three, thickening of the fibrous elements in the periosteum or perichondrium is followed by consequences which are manifested through the effects of local malnutrition due to interference with the blood and perhaps the lymph supply of the mucous membrane and the bone it covers. These are: 1. The metaplasia and cornification of the surface epithelium. 2. Round-cell infiltration. 3. Destruction of the blood vessels. 4. Destruction of the glands. 5. Destruction of the elastic fibers. 6. Absorption of the bone, especially of the inferior turbinate. 7. Destruction of the smooth muscle fibers in the stroma. 8. These structures, to some extent, replaced by round-cell infiltration and by lowly organized fibrous connective tissue sometimes approaching the embryonic type. 9. While these changes are going on there is excretion or transudation to the surface of lipo-proteids, derived from tissue-waste and

perverted gland function, which form a stinking, viscid secretion and crusts in which bacteria plentifully multiply. 10. Finally, this destructive metabolism ceases with the advent of old age. The foul secretions and crusts disappear, and the surface is moistened by a serous exudate which dilutes the remaining gland secretion sufficiently to secure its drainage. Thus nature brings about a cure difficult or impossible for man to accomplish.

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COMPLICATIONS OF THE OPERATION FOR REMOVAL OF TONSILS.*

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I have given my paper the above title in order to embrace all the procedures that are employed in the excision of diseased or enlarged tonsils. The removal of tonsils has become such an every day matter-of-fact operation that the general profession and the laity have grown to look upon tonsillectomy as a trivial affair, a simple procedure that has no danger, and that may be performed by any one. It seems, therefore, that it is adequate time for us to be considering our bearings and inquire if this operation be so simple as many seem to consider it, and whether it be devoid of serious danger to the welfare and life of the patient. It seems to me that it is wise for us at this time to turn our attention from the technic and the favorable issue of excision of the tonsils to the consideration of its complications and ascertain, if possible, the methods to avoid them. We are all more inclined to narrate and publish our own successful issues in medicine and surgery than our unfavorable ones, which fact, no doubt, accounts for the small number of complications of tonsillectomy reported in the literature. When one sees, hears, and occasionally reads of the unfortunate complications which ensue subsequent to the excision of tonsils, we wish it were considered the duty of every operator to report the complications which occur in his tonsillar surgery. In a careful review of this subject, one is impressed with the small number of complications. other than hemorrhage, that are reported. Several excellent papers have been published on the complications of tonsillectomy, most of them treating of one particular type of complication and referring to others. It will be my aim in this paper to collate all types of complications that may arise in connection with this operation, complications that have been reported in the literature accessible to my research. I shall also report in detail some of the complications which it has been my misfortune to encounter. Those cases in which complications ensue in conjoint tonsillar and adenoid operations are not reported, as frequently the complication is probably as much the result of the adenotomy as of the tonsillectomy. Neither should

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we consider the rather too frequent death from local or general anesthesia during tonsillectomy as a complication of this operation.

Hemorrhage: The most frequent and most dreaded complication of tonsillectomy is post-operative hemorrhage. Hemorrhage following tonsillectomy may be immediate or post-operative. Lindley Sewell1 reports fifty cases of serious hemorrhage, with nineteen deaths. As this report is the most recent one on this complication that I have read and his number of cases tallies with the numbers reported by others, I take it for granted that it probably summarizes all the extremely serious bleedings and deaths reported in previous papers. We all know from personal experience and from the experience of our immediate colleagues that this is by far an inadequate report of the serious hemorrhage resulting from tonsillectomy. I feel that technic and accident are more frequently the cause of this complication than hemophilia. To minimize the danger of this complication in tonsillectomy, I should suggest the employment of finger enucleation. The freedom from post-operative hemorrhage in enucleation is the strongest and most favorable argument for the general adoption of this method of operating.

Hyperpyrexia: Hyperpyrexia, without known cause, is a rare complication of this operation. Hyperpyrexia, with fatal termination occurring after operations of minor importance, is one of the unpleasant sequelae met with in general surgery; so we should not be unprepared for its occasional occurrence in our field of labor. An interesting case of this type is reported by Dr. D. J. G. Wishart.2 The patient was a girl, 18 years old, presenting no symptom other than those of enlarged tonsils and adenoids. The tonsils were slightly inflamed, coated with secretion, and the follicles were filled with cheesy detritus. The operation was done under general anesthesia, being attended with only moderate hemorrhage. Shortly after the operation the temperature rapidly rose a degree per hour until it reached 107°, and the patient died twelve hours after the completion of the operation. No post-mortem...

It has been my unpleasant experience to have had almost a case identical with that reported by Dr. Wishart. During March, 1909, I operated upon a child, 4 years of age, for enlarged tonsils and adenoids. When the child was brought to the operating room I was told that the patient had a temperature of 99.4°. I refused to operate and proceeded with several other operations upon other patients. After finishing my clinic, I visited the patient in its room and there was won over by the parents, who were anxious to have the operation done, to proceed with the operation. The operation was a remarkably easy and almost bloodless one and the patient was sent to its room in good condition. At four o'clock I was notified that the temperature was 102° and, from that time, its temperature rose steadily until it registered 107.2° at 10 p. m. The child died at 11:15 p. m. None of the treatment instituted influenced the upward tendency of the temperature. An autopsy was made in the early afternoon of the day following its death by Dr. L. W. Glazebrook. There was no blood in the stomach or intestinal tract and all organs of the body presented an absolutely normal macroscopic appearance. We were quite surprised at the findings and embarrassed at our inability to ascertain the cause of death.

Infarct of the lung: I have heard several cases of this character spoken of, but find none reported as such in the literature. When one considers the large cavity left between the pillars after the excision of the tonsil, with more or less bruised tissue which must slough away, it is rather surprising that this complication does not occur more frequently. I have had two cases of this character develop under my care. Two years ago, in June, I operated upon a vigorous, rather large, man of 45 years of age for the removal of both tonsils. The operation and convalescence was slow. A moderate fever continued for six days. On the seventh day the patient returned to his home and was lost sight of by me for nearly ten days, although under the constant care of his family physician. When I saw him again in consultation, I found the patient a very ill man. He was running a septic temperature, coughing constantly, complaining of great pain in the base of his right lung, and presenting a very anxious and distressed countenance. A slight area of dullness, with some moist râles could be made out over base of the right lung posteriorly. The patient was taken to his home in a distant state, when, several weeks later, the full evidence of an abscess of the lung developed, which was later operated upon and drained, with a favorable issue.

I have also had another case of the same character this winter. In December I operated upon a young married woman, 24 years of age, for hypertrophied tonsils. The case was simple in operation and attended with very little hemorrhage. The patient's throat was very sore for several days and the convalescence was slow. Ten days after the operation she developed a severe and harassing cough; the temperature had a moderately septic curve. Physical signs were negative over chest. On the thirteenth day the cough was more an-

noying and was frequently of a paroxysmal character. She now began to expectorate a large quantity of purulent, very offensive secretion, and complained greatly of an intensely offensive odor whenever she coughed. Examination of the sputum, which was very offensive in odor, demonstrated it to be made up largely of pus cells. The infecting organism was found to be a streptococcus. Physical examination demonstrated a small consolidation between the second and fourth ribs on the right side, with small mucous râles. On the fifteenth and sixteenth days she had great pain in upper portion of right lung. This pain recurred again on the twentieth day of illness. The patient was put on urotropin, and, in the course of three weeks, made a complete recovery, attended by a gradual and complete subsidence of all symptoms.

La Play³ reports an exceedingly interesting case. A child who had a double tonsillotomy done some eight days before being brought under his observation was thought to have diphtheria and antitoxin was administered. Culture examination proved the case to be of non-diphtheretic character. Subsequently the child, a patient of 8 years, developed pulmonary symptoms. Physical examination showed in the left lung distinct dullness, with an expiratory egophonic souffle. A pleurotomy was done and an abscess cavity drained. Culture of the pus demonstrated the presence of pneumococci. This case appears to be of embolic origin.

General sepsis: Mild sepsis, enduring for a few days, is a frequent complication of tonsillectomy, but the more severe types of general sepsis are seemingly quite infrequent, if one is to judge from the number of cases reported. It is not strange that sepsis follows such an operation when we consider the fact that such large open wounds are constantly bathed in such an abundant flora as is contained in the buccal cavity, but rather strange that it does not occur much more frequently in its severer forms.

A. Sonntag⁴ reports the following case: A boy, 7 years old, was operated upon. Two days after the operation the patient felt sick and showed torticollis towards the left side. On the third day there was vomiting, headache and delirium; in the evening, spasms; temperature 39.6°. On the seventh day there was swelling of knee and right wrist; somnolence increased and temperature rose to 40°. Death occurred on eleventh day from severe general infection. Dr. L. W. Dean, in an excellent article in The Laryngoscope, narrates three cases of sepsis following tonsillotomy and tonsillectomy. In his article Dean gives a full resume of all reported cases of sepsis

as a complication of excision of the tonsils. The first case reported by Dean was a death from general sepsis following tonsillectomy occurring in the practice of Dr. L. L. Smead, of Newton, Iowa. The patient was not in good general physical condition at the time of the operation. All care was employed at the time of the operation to insure as aseptic an operation as possible. The operation was done under local anesthesia. The right tonsil was enucleated and the greater portion of the left. The operation on the left tonsil was incomplete on account of hemorrhage. The wound surface and adjacent tissue, as well as the glands of neck, were greatly inflamed the day after the operation. The temperature ran between 102° and 103°. There was great difficulty in swallowing and breathing. On the third day there was delirium, dimness of vision, and slight vomiting. The amount of urine eliminated became progressively less. On the sixth day all lymphatic glands of body were enlarged; delirium was more pronounced. The patient died on the evening of the sixth day.

The second case reported by Dr. Dean was one of cerebral thrombo-sinusitis, following tonsillotomy with recovery, occurring in his own practice. The patient, a boy of 14 years, was operated upon under local anesthesia at the clinic. He did not remain in hospital after the operation, as directed, and Dr. Dean did not see him again until a week after the operation. The following is the condition of the patient as reported on the seventh day: "The remains of the tonsils were somewhat swollen and reddened. The out surfaces were covered with a fibrous exudate. The pharynx was also inflamed. 'The condition of the throat was not bad. The temperature was 105°. It had been intermittent. There had been a series of chills. Pulse was 100, very weak. Patient was delirious. Along the anterior border of the sterno-cleido-mastoid muscle a cord-like swelling could be easily felt. On the left side was exophthalmos with panophthalmitis. On the right side was a well-marked optic neuritis. The ear and mastoid seemed normal. Dr. Kimbell's physical examination was negative. Diagnosis: septic phlebitis involving the internal jugular and extending along the cerebra sinuses to the orbital veins, accompanied by thrombosis of the orbital veins on the left and perhaps of the left cavernous sinus. A very bad prognosis was made." The patient recovered. The third case was one of gangrene of muscle of neck following tonsillectomy. with recovery. The condition narrated did not manifest itself until fifteen days after the operation. The case was one of extensive infection of the glands and tissues of the neck. The condition was met by free incisions and use of bichlorid washing and drainage.

Ballenger⁵ reports two severe cases of streptococcus infection. Pierce⁶ reports a serious case of infection resulting in a permanent torticollis following a tonsillectomy. Dr. C. E. Deane⁷ reports two cases of severe sepsis occurring in his practice.

Emphysema: Subcutaneous surgical emphysema is fortunately a rare complication of tonsillectomy. An interesting case of this character in which the emphysema was very extensive is reported by Dr. Benjamin D. Parrish⁸ of Philadelphia. He does not give the name of the operator in his article, or the hospital in which the operation was performed. He states the patient left the operating room in good condition. The operation was attended with a little more bleeding than is usual in such operations. He states that the tonsils were quite adherent and in freezing them a small buttonhole was made in the lower part of the posterior pillar on the left side. "The orderly and nurse noticed on the elevator that the patient seemed to be struggling for breath and also that his neck and face were swelling rapidly." He states that, when he reached the patient, the breathing was rapid and shallow, the face was livid, and the lips cyanosed. The entire neck was puffed out so that the line of the jaw was completely obliterated. The emphysema affected the face and right eyelid and emphysematous crackling extended over the anterior portion of chest as far down as the last rib. By flexing the neck and opening the mouth the breathing was restored and further extension of the emphysema prevented. The patient made a good recovery, with gradual absorption of the emphysema.

I had a mild emphysema occur in my practice, also in a male adult. The emphysema followed a double tonsillectomy and involved only the right side of the neck. In this case the emphysema was noted about an hour after the operation and extended on the right side of the neck almost to the line of the clavicle. There was only moderate swelling, but very distinct crackling. It subsided completely within forty-eight hours.

Infection of the lungs and serous membranes: The occurrence of pneumonia and pleurisy as sequelas of tonsillectomy is not usually reported, but there is a sufficient number of cases incidentally reported that indicates that this is not an infrequent complication. In my own practice, covering now some years, I have had two cases of pleurisy, both of which recovered, and one case of pneumonia, which was fatal in its termination.

Coley, as quoted by F. C. Ard, reports three cases of septic infection of the serous membranes under his observation, and Putnam as having seen two cases of meningitis following the operation.

In a recent article, Eugene A. Crockett^o states that in the Massaschusetts Charitable Eye and Ear Infirmary, within the past few years, there had been two cases of ether pneumonia, one of which died.

Disturbances in relationship to the nervous system: Complications in connection with the nervous system are more apt to occur in those of a hysterical temperament. I found two cases of this character to report.

E. Bergh¹⁰ reports a case in which nervous disturbances developed after tonsillectomy in a female child, 7 years old. Immediately after the operation the little patient had an attack of strangulation, followed by spasmodic contraction of the thighs on the abdomen. Patient had at decreasing frequency subsequent attacks of strangulation, followed by muscular contractions. Patient finally recovered under treatment. Bergh states that the patient was of a nervous temperament, but the nervous attracks were doubtless due to the tonsillectomy.

Pfingst reports quite an interesting case of hysterical hemiplegia coming on a week after a tonsillectomy. This patient was a robust young woman, 18 years of age, with a personal history of an hysterical temperament. She manifested a number of symptoms during her illness, all of which partook of the hysterical type. The patient remained in this condition for a period of three months, when gradual improvement set in. The last symptom to disappear was the hemiplegia, which entirely disappeared four months after the tonsillectomy.

Status lymphaticus: Dr. F. R. Packardii gives the report of a case upon which he performed the operation of tonsillectomy, which resulted in death, apparently due to a status lymphaticus. The operation was done without incident of any kind whatever, upon a female child 31/2 years of age. He states, "the child was apparently a perfectly normal little girl, of the average size and healthy appearance, except for a somewhat sallow complexion." Immediately after the operation, nor at any subsequent period was there any bleeding. When coming out from under the ether, she vomited a small quantity of blood. The operation was done at 1 p. m. At 4:30, 5:30 and 6:30 p. m. the child was examined and no bleeding noted. About 6:20 the little one's condition became very serious, temperature 100°, respiration 36, and pulse rate 156. At 7 p. m. the child stopped breathing, for which no relief came, although tracheotomy was done. No autopsy was obtained. Packard states, "this case presents features which, to my mind, render it practically certain that the fatal result was due to the condition known as status lymphaticus. The child's death was certainly not due to hemorrhage, nor could it be attributed to the method of administering the anesthetic or the quantity used. As to status lymphaticus so little is really known about it that, unless an autopsy had been obtained and an enlarged thymus gland found, it would be impossible to state positively that this condition had been the cause of the child's death."

Dr. T. J. Harris12 reports a case of death from status lymphaticus. In Dr. Harris' case the operation was done under cocain-adrenalin infiltration. Two injections of the local anesthetic were administered, as it was thought that all of the first given was lost through escapage from the follicles of the diseased tonsils. The patient was profoundly impressed after the first injection. "Complained of feeling bad, vomited, had a slight, convulsive seizure, presenting the appearance we often see when cocain has been employed locally for a nasal operation." It was necessary to support the patient during the operation. After the completion of the operation Dr. Harris states he was struck by the pallor of the patient and discovered he was unconscious. All efforts at resuscitation, employed for over an hour, failed. An autopsy was performed, and nothing abnormal discovered except that the right auricle was swollen and the right auricular appendage was dilated with fluid blood until it was five times as large as the left; the right ventricle was also swollen; and the thymus gland was hypertrophied and weighed eighteen grammes. The examination of the thymus gland demonstrated that it showed no atrophy. Dr. Harris states that "the patient died, in all probability, of an over-dilated right ventricle, due to the enlarged thymus, with its action on the trachea and recurring laryngeal, with the cocain-adrenalin injection acting as an exciting cause." Dr. E. B. Dench also reports a case of status lymphaticus.

Amygdalotomy rash: This complication occurs rarely as a sequela to the removal of the tonsils and is of no consequence except for the anxiety it may cause. It usually appears from two to three days after the operation and appears either in a roseola, papular or erythematous form. It makes the initial appearance usually on the chest, abdomen or limbs. It may or may not be attended by itching. It attains its maximum intensity in a day or two and then rapidly disappears. It is usually attended by a slight elevation of the temperature. Dr. Wyatt Wingrave reports thirty-four cases of the rash. Dr. Edgar Forsyth¹³ also reports cases in an excellent paper. I have had this rash appear in four cases upon which I have operated. Dr. S. S. Adams reported it as occurring in a case upon

which I operated, while the patient was under his observation. This condition is no doubt due to an auto-intoxication from the blood which is swallowed during the operation. A brisk purgative the day after the operation should prevent the occurrence of the complication.

Diphtheria: A case of diphtheria following tonsillotomy is reported by August Caille¹⁴. This complication can only result in operating upon a patient who is a carrier. For this reason it would be wise to make cultures of the faucial secretions of all children upon whom the operation is to be done.

Oswald Lovenstein¹⁵ after an extensive review of the subject of diphtheria in connection with tonsillotomy, makes the statement that the mucous membrane of the mouth and nose lodge a considerable number of cocci, spirilla and bacilli of many varieties; among the latter may sometimes be found virulent Klebs-Loeffler bacilli. He gives reports of cases of diphtheria ensuing after tonsillotomy. Lichtwitz¹⁶, in two different articles appearing in 1896 and 1900, discusses the diphtheritic phase of tonsillar complications.

F. Kobrak¹⁷ reports a case of excision of the tonsils in a female child, within three days after she showed severe symptoms of angina, with the formation of a membrane which proved to be diphtheritic. To this was added an eruption of scarlatina. The child died.

Local disturbances as sequelae of tonsillar operations: There are a few cases reported of injury about the faucial region, less, probably by far, than actually occur, as many of these result from accident during operation and from faulty technic; therefore, the operator hesitates to report them.

Dr. Lindley Sewell in his paper reports two cases of tracheotomy which were necessitated on account of prolonged glottis spasm with collapse and cyanosis. Without giving authority he also reports a case of torticollis and a case of retro-pharyngeal abscess. Bauchecourt and Martin, as quoted by Dean, report three cases of edema of the pharynx and the glottis, one of which was fatal.

Dr. I. Lederman¹s reports a unique complication in the formation of a hematoma in the fauces following a tonsillectomy. Dr. Lederman states that shortly after the removal of the tonsil, blood began to extravasate under the mucous membrane until a large mass nearly the size of a hen's egg was found in the tissue of the palatine arch.

Dr. Francis Huber¹⁹ reports a case of lateral pharyngeal abscess eccurring in a child two years old, following a tonsillectomy. Dr.

Van D. Hedges, of Plainfield, New Jersey, is reported, by Dr. F. C. Ard, to have observed two cases of torticollis following tonsillectomy. The condition lasted two months in one patient and one month in the other. Condition ascribed to sepsis.

Injury to the pillars and accidental removal of the uvula are not uncommon results of operative work for removal of the faucial tonsils. Cicatrices forming in the palatine arch, which more or less impair the movement of the vela curtain and adhesion of the anterior and posterior pillars to each other in the process of repair, are possible occurrences. These results are not of any serious moment to the speaking voice, unless the injury is great, but are of decided moment to the singing voice or to the voice used for elocution purposes.

Dr. Hudson-Makuen²⁰ writes, in no hesitating terms, in regard to these conditions, as follows: "Seeing as I do many children having defects of voice and speech, day after day for many successive weeks, I have, perhaps, a somewhat unusual opportunity for studying the local, as well as the general, effects of the operation under discussion, and I confess to you that I have been amazed at the apparent disregard for the surrounding structures with which much of this work is done. The sacrifice of one or more pillars of the palate and of the uvula seems not to give some operators any concern whatsoever and the results upon the voice and speech have been in some cases, not only disastrous, but altogether irreparable."

Infection of the middle ear: As a complication of tonsillectomy this is an occasional occurrence, as all operators are aware, but I find only a few reports of such infection. To be sure, this complication is more apt to occur after operation for adenoids than after tonsillectomy.

Infection of the cercical glands: This is also another type of complication which is occasionally manifested, but, as it is looked upon by operators as only an incident in the cases, they are not usually reported.

Unclassified: A case of gangrene, with death, is reported by Ter Kenle in a child of 7 years, eight days after a tonsillotomy, as quoted by Dr. S. M. Bourack.²¹

In Crockett's article, previously referred to, he states, "The occurrence of twelve deaths in this city (Boston) and its suburbs in the last year and a half or two, following the removal of tonsils, as well as the occurrence of a large number of very considerable-hemorrhages, also fatal unless checked by experienced hands, would prove to my mind that it is not wise to advise such removal except

on sufficient symptoms." Evidently these twelve cases of death referred to by Crockett have not been reported by the operators, neither can they be classified, as the reporter does not refer to the causes of death.

Also, as unclassified may be mentioned the case reported by Schuchardt²² of a case of a sudden death following excision of tonsils, due to hemorrhage, asphyxiation or shock. The patient was a child of 13 years of age, of the lymphatic, chlorotic constitution, who died immediately after the removal of the right tonsil, the left having been previously operated upon. All methods of restoration were adopted, including tracheotomy.

If anything can be gleaned from the reports which I have enumerated above, it would seem to be that consillectomy may be at times attended by most serious, even fatal, complications. It behooves us, therefore, to be most careful in our technic and most cautious in our post-operative attention to our patients. Tonsillectomy, therefore, should be considered a major operation and the patient should be prepared and surrounded with all the post-operative attention as in any major operation.

With such knowledge, is it proper and wise to suggest this operation, as is often done by the internist, with insufficient and inaccurate data from a local standpoint, as a prophylactic measure? I believe that this point of view, as an overwhelming demand for the removal of the tonsils, is too often presented to the reluctant patient. I believe that a few general conditions probably have their portal of entry into the general system through the tonsils, but I would demand that, in every individual case, the tonsil be first proved to be guilty before it is sacrificed. When suggesting such a procedure under such conditions one must hold steadfastly in mind the fact that we by this operation are placing the patient in danger of his life—probably a greater danger to his life than the possible remote infection.

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The Surgical Anatomy, Diagnosis and Treatment of the Inflammatory Affections of the Nasal Accessory Sinuses in Children.

SEYMOUR OPPENHEIMER, Arch. of Ped., Jan., 1913.

The antra, though rudimentary at birth, are well defined and they and the ethmoid cells are the most important of the sinuses in childhood. The frontal sinuses only develop in the seventh or eighth year, and the sphenoid is usually formed by that time. The recognition of any form of sinusitis in childhood is difficult, and yet the frequency of the acute infectious diseases renders sinus trouble more common than is generally supposed. The author attaches great importance to the x-ray in diagnosis. The treatment of the various sinus conditions in childhood, as stated by the author, varies but little in principles from the methods pursued in adults.

PACKARD.

THE DIFFERENTIAL DIAGNOSIS BETWEEN VINCENT'S ANGINA AND PRIMARY SYPHILITIC LESION OF THE TONSIL.*

DR. ROBERT LEVY, DENVER.

A young man, 24 years of age, was taken sick with the usual symptoms of sore throat, both general and local. Being subject to attacks of this kind at least once a year he thought nothing of his condition until he began to have great pain upon swallowing, with some swelling of the neck. He called in his family physician, who pronounced his a case of quinsy involving both sides. The swollen tissues were incised and shortly after there was a sudden discharge of a small cupful of bloody pus, which, however, did not give the expected relief.

Between two and three weeks after the onset the swelling in the neck became more marked, and one week after the supposed abscess broke, I was called to see the case. I found the patient weak, somewhat emaciated, suffering considerable pain, more marked upon swallowing, a slightly increased temperature and moderately rapid pulse. The examination of the throat revealed a bilateral swelling of the tonsillar and peritonsillar structures. There seemed to be comparatively little difference in the two sides. Upon the surface of the swollen tonsils a tenacious, gray exudate could be seen uniformly distributed. To the touch the tumefaction seemed to be harder on the left than on the right side and on this side also the cervical adenitis was more pronounced. No local or general treatment was of any avail. Within one week the swelling on the right side had subsided but on the left there developed a distinct ulcero-membranous lesion with dirty, greenish-gray exudate which was readily removed, leaving a bleeding surface. The surrounding margins were elevated and moderately hard.

Vincent's angina appeared to be the clinical diagnosis. Bacteriological examination of the exudate as well as of the serum from the surface obtained by curetting, revealed the presence of numerous fusiform bacilli and what was apparently a typical Vincent spirochete but failed to disclose the spirocheta pallida. More vigorous local treatment such as is recommended in Vincent's angina was instituted and still the patient made very unsatisfactory

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progress. Two subsequent examinations for spirocheta pallida were made, both of which were negative.

At the end of six weeks from the onset of the affection, secondary skin lesions manifested themselves and the Wassermann reaction was now positive. One injection of salvarsan cleared up the local lesion and the subsequent history of the case confirmed the diagnosis of chancre of the tonsil. The mode of infection was traced to a drinking cup which was used in a shop as common property. It was discovered that in this shop one of the employees had a syphilitic sore throat.

This case is cited as an illustration of the difficulty in differentiating two lesions, both of which are by many considered rather rare, but which, upon a study of the literature, will be found to be not uncommon. Vincent's angina as an entity is becoming more frequent as our attention is called to it and as our methods of recognizing it are becoming more positive, and although for several years after its description by Plaut, in 1894, and Vincent, in 1896, few cases were recorded, recent literature has placed so many of these cases before us that it is no longer the subject of special comment.

Chancre of the tonsil is also less uncommon than generally believed. By many authorities it is held to be the most frequent of all extra-genital primary lesions. Several other cases occurring in my own practice and reported by others have caused much discussion as to the possibility of differentiating these two lesions in their early manifestation. In the case related above, the diagnosis of Vincent's angina was borne out by clinical and bacteriological findings, but the subsequent history of the case proved it to be one of syphilis. On the other hand, a most interesting case is reported by Zinsser, in which he states that when the patient "came under observation the lesion was a characteristic chancre of the tonsil but proved to be one of non-specific ulcer belonging to the Plaut-Vincent group." The difficulty is further increased by a similarity in the spirilli in the two conditions, by the fact that salvarsan has been shown by Gerber to be destructive of other spirochetes besides those of syphilis and by the healing of a case of Vincent's angina by this method.

What is the typical appearance of Vincent's angina? I believe it is impossible to state this, in that it may manifest itself in a mild or a severe form. The appearance, generally speaking, is that of a dirty ulceration, irregular in outline, having a hard, everted edge, and with a tendency to spread deeply rather than superficially. The

surface of the ulceration is covered with a grayish-green pultaceous deposit and is readily wiped off, leaving a bleeding surface beneath.

What is the typical appearance of chancre of the tonsil? It is also impossible to answer this definitely. Generally speaking, it presents the appearance of a dirty ulceration surrounded by a zone of indurated tissue, the edges everted and the exudate upon its surface dirty and pultaceous, leaving a bleeding surface beneath. The similarity in the local appearances is further found in the general and local symptoms. In both lesions the pain may be slight or severe. In both the constitutional symptoms may be mild or marked by slight rise of temperature, general malaise and slight, though gradually increasing malnutrition. The glandular involvement is found in both, presenting itself sometimes early and sometimes after several weeks. As far, therefore, as local appearances and general or local subjective symptoms are concerned, the diagnosis cannot be positively made.

Of what help will the history of the case be? Very little, if any, in the majority of cases. Chancre of the tonsil is acquired either innocently through drinking utensils and the like or as the result of perverse sexual practices. In the first instance the patient is unaware of having acquired the infection and consequently cannot aid the investigation, and in the second instance, knowing the possibility of acquiring an infection he will not admit the bestial practice and so will not aid the investigation.

We therefore look with hope to the result of bacteriological research and what problems have we here to confuse us? In the case of chancre we expect to find the spirocheta pallida, but although this micro-organism when found, is positive identification of the disease, it has been shown that it may be recovered almost invariably from glands secondarily involved but that rarely is it found in the early stage of the tonsillar lesion. In a series of investigations to determine if it be possible to recover the spirocheta pallida from the tonsils, Campbell found it possible in 80 per cent to 90 per cent of untreated cases with secondary lesions, but did not find it in his primary cases. One should not be misled by the discovery of the spirocheta dentium which is very frequently found in the mouth and is the one spirocheta which is more likely than any other to be mistaken for the pallida.

The spirillum of Vincent which is associated with the fusiform bacillus in Vincent's angina is somewhat more easily distinguished but nevertheless, as stated by Zinsser, the differential diagnosis of spirocheta of the mouth requires the greatest caution because of

their close resemblance to one another. Moreover, it has been shown that the characteristic Plaut-Vincent micro-organisms are present as innocuous saphrophytes in many mouths, and especially in those in which there are carious teeth. Their favorite location seems to be around the gums and in the tonsils.

How then can bacteriological examination aid us? Only partially and indefinitely. Positive or negative results of microscopic investigation offer nothing reliable or pathognomonic except in the one instance, namely, the finding of undoubted spirocheta pallida in a local lesion having the suspicious appearance of chancre. A certain amount of reliance may be placed upon the finding of the Plaut-Vincent micro-organisms in abundance. It is true that the spirocheta and the fusiform bacillus in symbiosis must be present in order to establish the diagnosis of Vincent's angina and it is also true that they must be found in large numbers and almost to the entire exclusion of other micro-organisms. Such finding gives us decided assistance.

How then can the diagnosis be made? In the light of our present knowledge and with the exceptions mentioned above, a positive diagnosis cannot be made. We may form a tentative opinion as to the most likely nature of the lesion, but during its early stages we should give a very guarded opinion. The progress of the case will be our most valuable guide. Vincent's angina is often a self-limited affection and is generally amenable to local treatment. Primary syphilitic lesion may also be self-limited, but in time, secondary lesions will manifest themselves. These should be carefully watched for in every case, even after the local lesion has healed. One should, therefore, look upon every ulcero-membranous lesion of the tonsil with suspicion, reserving his judgment until the progress of the case establishes the diagnosis.

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Technical Remarks on Tonsillectomy. H. Marschik, Monatschr. f. Ohrenh., Heft 1, 1913, p. 80.

The author discusses the preferred raspatory for enucleation, the Whitehead mouth-gag, the proper illumination of the operative field, anesthesia and the instruments and technic employed in the Chiari clinic.

SUSPENSION LARYNGOSCOPY, WITH REPORT OF CASES.*

DR. SAMUEL IGLAUER, CINCINNATI.

Nature has well fortified the larynx against invasion. Its sensitive reflexes and marvelous mechanism constitute its defenses. The larynx can only be entered when off its guard or when it is lulled to sleep by anesthetics. The time-honored method of operating within the larynx by the aid of the image in the laryngeal mirror has yielded brilliant results but requires prolonged training on the part of the operator as well as the active co-operation of the patient. Direct laryngoscopy by means of a long spatula as first advocated by Kirstein and subsequently improved by the tubes of Killian, Jackson, Bruenings and others has constituted a great step in advance and has enabled the operator to become somewhat more independent of the patient. The personal equation of the latter, however, still enters into the success of the procedure unless a general anesthetic is employed. In addition, the operator is somewhat restricted in his endeavors owing to the fact that one hand is constantly engaged in holding the spatula in place and the instrumentation is necessarily restricted by the walls of the tube.

The recent discovery by Killian¹⁻² of a new method of laryngoscopy, i. e., suspension laryngoscopy, has eliminated most of these difficulties and bids fair to greatly widen the field of intra-laryngeal surgery. This discovery was largely the result of an accident and came about in the following manner:

Desiring to obtain some drawing of the larynx and deeper pharynx, Killian introduced a long spatula into the larynx of a cadaver, in which the head overhung the edge of the table. In order to give the artist sufficient time to reproduce what he saw, Killian fastened the handle of the instrument to a support immediately above the table and was rather astonished to find that the head of the cadaver swung freely suspended on the spatula. This experience led him to make repeated experiments on cadavers and finally to try it on the living. He found that he obtained an excellent view of the parts and that patients bore the procedure very well. Killian modified his original spatula from time to time, and it was finally perfected by one of his assistants, Dr. Albrecht, 3-4 of Berlin.

 $^{^{\}circ}\mathrm{Read}$ at the meeting of the Academy of Medicine of Cincinnati, April 7, 1913.

Description of the Instrument: Albrecht's improved hook-spatula (Figure 1) consists of a long, grooved tongue blade (A) bifurcated at the end so as to fit into the valleculae at the base of the tongue, and having a median sliding prolongation to fit behind the epiglottis. (B, B¹.) The spatula (3 sizes) is attached to a vertical arm or handle (H) which in turn is connected above with a hori-

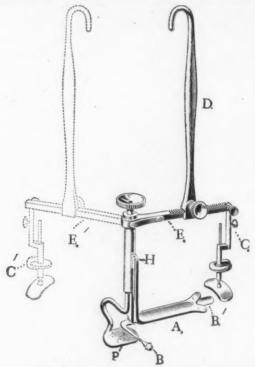


Figure 1. Albrecht's improved hook-spatula, A. Tongue-blade, B, B $^{\rm I}$ Sliding Prolongation. H. Handle, E. Horizontal arm. D, Suspension-hook, P. Tooth-plate, C. Counter-pressor.

zontal arm in the same plane as the spatula. (E). The horizontal arm, which can be rotated to one side if necessary (E^1). On the horizontal arm is the adjustable vertical suspension hook (D) which sliding on a ratchet enables one to bring the center of gravity-over the tip of the spatula. The instrument is also provided with a tooth-plate to fit behind the upper incisor teeth in order to prevent the spatula from gliding out of the mouth. (P) (C), is a counter-

pressor, which may, if necessary, be applied to the external surface of the larynx in order to bring the anterior commissure into view.

Quite recently Lautenschlaeger⁵ modified the spatula and claims to have simplified and improved the instrument. In this country, Freudenthal⁶ has reported excellent results from the use of Albrecht's instrument.

In addition to the spatula, one must have at the end of the table some sort of adjustable horizontal bar, which must be strong enough to support the weight of the patient's head. For this purpose Killian attached to the side of the table a special adjustable apparatus to which he gave the rather suggestive name of gallows.

I have found that the horizontal portion of the ordinary instrument tray serves well as an excellent support for the spatula.

(Figure 2).

Technic: The technic of suspension laryngoscopy is as follows: As a source of illumination the ordinary head-mirror, the Klaar electroscope, or small electric lights attached to the instrument may be employed. Suspension laryngoscopy may be carried out either under local or general anesthesia. As a rule, local anesthesia suffices for adults, but in order to obtain the necessary relaxation it must be reinforced by an injection of scopalamin, gr. 1/150, and morphin, gr. 1/4, administered a half hour before the operation.

Local anesthesia is obtained by applications of a 20 per cent solution of cocain (a few drops of adrenalin added) to the pharynx, the base of the tongue and the larynx. Children usually require a preliminary dose of codein followed by a general anesthetic, and in addition a few local applications of cocain are necessary to abolish the reflexes.

After anesthesia has been obtained, the patient lies, or is placed in the dorsal position with his head overhanging the end of the table. An assistant supports the head, since the spatula can be more readily introduced if the head be only partially extended. The patient is now instructed to hold out his tongue. (Mouth-gag and tongue-forceps under general anesthesia.) The operator seated on a low stool or kneeling at the head of the table introduces the spatula into the mouth until it approaches the epiglottis. At the same time the tooth-plate is placed behind the upper incisors. The median or sliding blade of the spatula is now pushed behind the epiglottis, while the head is gradually lowered by the assistant and under direct inspection, the median blade is brought in contact with the laryngeal surface of the epiglottis, while the bifurcated tip of

the spatula is pressed into the valleculae at the base of the tongue. (The median blade need not be used if the interior of the laryńx is not to be exposed, and in children it can usually be dispensed with entirely.) The horizontal limb of the spatula, which, up to this time has been turned to one side to avoid contact with the patient's



Figure 2 shows the patient's head held in suspension. (Photograph by Dr. Albert Freiberg.)

chest, (Figure 1, E¹), is now swung into the median line and the hook on the end of the spatula is fastened to the gallows. The assistant now slowly releases the patient's head, which is allowed to swing freely upon the spatula (Figure 2). The suspended head is supported by the structures attached to the hyoid bone and lower

jaw as perfectly demonstrated in the radiogram (Figure 3) which Dr. Lange has been kind enough to make for me. Contrary to what one might expect, suspension is borne by the patient without much discomfort and may be continued for some time. In one instance, Killian demonstrated a case for over an hour, and at another time

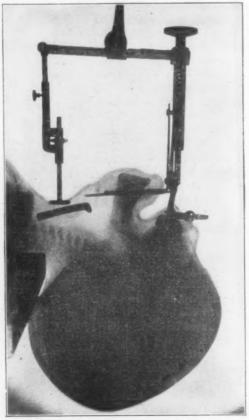


Figure 3. Radiogram showing the suspension laryngoscope in situ in the cadaver of a child. An intubation tube has been introduced into the larynx. Note position of hyoid bone and the ballooning of the pharynx-

exhibited a patient to 120 persons. One of my patients made peculiar sounds during suspension and I thought him in distress, but on subsequent inquiry he stated that he was merely laughing at some poor joke of which someone in the operating-room was guilty.

After making finer adjustments the structures brought into view with the head under suspension consist of the hard and soft palate, the tonsils with the anterior and posterior pillars under tension, the hypo-pharynx, the cricoid ring, the arytenoids and the posterior part of the vocal cords. In order to bring the anterior commissure into view, slight pressure may be made with the finger or counterpressor (Figure 1, C; also Figure 3) on the external surface of the thyroid cartilage. Quite frequently the trachea may be inspected, (suspension-tracheoscopy). The parts under examination may be viewed directly and from many angles, so that there is a certain plasticity and perspective obtained, which is wanting under any other method. This wide field of vision, as well as the wide approach to the larynx, gives a great advantage to the operator while both of his hands are free for any necessary manipulations.

Report of Cases: The following cases illustrate some of the uses of suspension laryngoscopy:

Case 1: Mrs. J. B., age 38, on the service of Dr. Hoppe, Cincinnati Hospital. Diagnosis: Bulbar paralysis. Patient was unable to swallow, and the pharynx, soft palate, and tongue were insensitive. A slight application of cocain was made to the base of the tongue and to the epiglottis. Suspension laryngoscopy was performed and the larynx with the exception of the anterior commissure was brought distinctly into view. The motion of the cords was unimpaired. A probe was applied to the glottic region and showed some sensation still present with slight reflexes. The patient was demonstrated to several internes and students, who obtained an excellent view of the larynx.

Case 2: Cauterization of the larynx under suspension laryngoscopy. Mr. A. R., aged 28, consulted me in June, 1912, complaining of slight hoarseness and slight pain on swallowing. Previous history: About four years before, patient contracted pulmonary tuberculosis and went West for his health, working as a surveyor. He was compelled to use his voice a great deal, and one day about three years ago he suddenly became hoarse.

Examination of the larynx: The mucous membrane along the right border of the epiglottis was ulcerated, exposing the underlying cartilage. There was but very little inflammatory reaction about the ulcer. There was a slight thickening of the inter-arytenoid space with edema of the ary-epiglottic folds.

Treatment: The ulcerated epiglottis was cauterized several times under direct laryngoscopy, and the ulcer began to heal. On March 16, 1913 a small ulcer still remained on the epiglottis to the

right of the median line with slight edema of the ary-epiglottic folds and slight inter-arytenoid infiltration. Patient was given a hypodermic of scopalamin, gr. 1/150 and morphin, gr. 1/4, one-half hour before the operation. Twenty per cent cocain solution was then applied to the pharynx, larynx and base of the tongue. Under suspension laryngoscopy the ulcerated epiglottis was thoroughly cauterized and igni-puncture was made in the inter-arytenoid space. Patient stated after the operation that he had experienced no discomfort whatever. A slight inflammatory reaction followed at the site of cauterization, without any pain or difficulty in swallowing. At the present time the ulcer is practically healed.

Case 3: Electro-cauterization for tuberculosis of the larynx.

Mr. F. K., aged 53, referred by Dr. Behrman, February 26, 1913.

complaining of pain in the larvnx and hoarseness,

Previous history: Patient was always well until six years ago, when he had a slight attack of pleurisy. Consulted Dr. Behrman in June, 1913, who found signs of chronic laryngitis with thickening of the right cord. During the past two weeks an ulcer suddenly appeared on this cord. Examination of the larynx revealed an ulcer on the right cord about 3% of an inch long and 1% of an inch wide occupying the middle third of the cord. The ulcer was grayish-white in color, superficial with slightly reddened overhanging edges. The remainder of the cord was congested. The motion of the cord was not impaired. There was a slight thickening in the inter-arytenoid space to the left with a small ulcer at this point. Smears from the ulcer failed to show any tubercle bacilli. The diagnosis rested between tuberculosis and carcinoma. On March 1, 1913, a small portion of the ulcer was punched out under indirect laryngoscopy for a microscopic examination. The laboratory report of Prof. Wooley and Dr. Mombach stated that a few tubercle bacilli were found in the section. March 18, 1913, after a preliminary injection scopalamin and morphin and a local application of a 20 per cent cocain solution, the patient was placed in suspension. The inter-arytenoid space was easily seen and the electro-cautery applied. There was some difficulty in bringing the vocal cord into view, so that the patient was seated in a chair and the cautery applied by the direct method.

Case 4: Igni-puncture of a tuberculous infiltration of the larynx. Mrs. K., aged 34, referred by Dr. G. M. Galley. Chief complaint: Aphonia with pain in the larynx radiating toward the left ear and down the left side of the neck. Patient became ill about a year ago, at which time Dr. Galley made a diagnosis of pulmonary tuberculosis with positive sputum. Patient has spent the past year at the Mt.

Vernon Sanitorium, where she has gained thirty-five pounds. The aphonia began about a year ago, while the pain has been present for the last three or four weeks.

Examination of the larynx: There is a marked infiltration of the inter-arytenoid space with slight edema of the ary-epiglottic folds. No ulceration visible. The cords appear normal, but cannot be approximated, hence the aphonia.

March 22, 1913. Scopalamin, morphin and cocain anesthesia was employed. Suspension laryngoscopy was then performed and several deep punctures were made with the electro-cautery into the infiltrated arytenoid space.

Case 5. Removal of a papilloma of the larynx under suspension laryngoscopy. E. D., aged 3, patient of Drs. Corliss and Sattler. Child first came under observation on August 25, 1912, suffering greatly from inspiratory dyspnea with aphonia. This condition had been coming on gradually for two years. An examination of the larynx by the direct method showed a large, papillomatous mass on the left vocal cord, and at the anterior commissure.

The first attempt to remove the tumor without the aid of a general anesthetic proved a failure, since after prolonged effort the child became almost asphyxiated and required artificial respiration. Two days later, under the ether-chloroform sequence the papilloma was easily removed by the direct method.

December 23, 1912, child returned to the city with great improvement in breathing and voice. A slight recurrence of the papilloma was removed by the direct method under local anesthesia.

On March 18, 1913, a small papillomatous mass was noticed on the posterior commissure. Under local anesthesia and suspension laryngoscopy this was removed with but little difficulty with Mosher's spiral forceps. Previous attempts to use this instrument on this patient had always failed. In addition to the surgical treatment, Dr. Lange has employed the x-rays with the idea of preventing recurrence.

Case 6. Removal of a papilloma from the larynx. Miss A. T., aged 20, seen in consultation with Dr. W. Harris, March 29, 1913. The patient has been hoarse since early childhood, and suffers with slight dyspnea on exertion. Several years ago Dr. Harris removed a papilloma from her larynx; the hoarseness has increased during the past year. Examination with the mirror was very difficult, but after applying cocain, a small, pedunculated mass about the size of a pea apparently attached at the anterior commissure could be made out, and also some small papillomata in the inter-arytenoid space. April 1, 1913, under scopalamin, morphin and cocain anesthesia,

an attempt was made to remove the papillomata under suspension laryngoscopy. The reflexes persisted for some time and a second hypodermic of morphin was given. Mosher's forceps brought away some small fragments. The spatula was then introduced behind the epiglottis beautifully demonstrating the tumor, which was removed in several pieces.

Comment: Owing to the disposition of this patient and the strong reflexes, the tumor would probably not have been removed by any other method without the aid of a general anesthetic.

In addition to the above cases* following the suggestion of Killian, I have undertaken the enucleation of the tonsils in three cases, but can see no special advantage in this procedure.

Conclusions.† Suspension laryngoscopy has certain distinct advantages for the patient, the surgeon and the student.

The patient takes a passive part in the procedure, suffers but little discomfort, can tolerate prolonged operations within the larynx and is not annoyed by saliva or blood flowing into the trachea.

The operator works in an easy position with both hands free, and has a wide field of vision with the larynx at close range with ample space for all necessary manipulation. Much more extensive intra-laryngeal operations are now possible than heretofore. As suggested by Killian operations upon the palate, pharynx and tonsils may at times be advantageously carried out with the patient in suspension.

The pathology and the surgery of the larynx can be better demonstrated to students by this method than by any other.

In short, suspension laryngoscopy constitutes a distinct and notable advance in the domain of laryngology.

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*Since the above was written, an additional case have come under observation, with Dr. J. W. Murphy in consultation.

Mr. A. L. had a tumor of about the size of a small navy bean situated just above the vocal process of the right cord. The nature of the tumor was uncertain. On April 7, 1913, an attempt was made to remove the tumor by introducing the suspension laryngoscope behind the epiglottis. All blades proved too short (patient being 6 feet 2 inches in height) and slipped out of the larynx. Finally a medium-sized blade was introduced obliquely from the angle of the mouth and the tumor was removed.

[†]At the conclusion of the reading of this paper, suspension laryngoscopy was demonstrated upon a patient, and all those present had an opportunity of viewing the larynx, etc.

REGENERATION OF THE MEMBRANA TYMPANI.*

DR. GEORGE M. COATES, PHILADELPHIA.

It is a common sight in the treatment of aural disease to find false or cicatricial membranes occluding the external auditory canal, and these are often a source of great annoyance to the aurist. They are of two kinds; those of a firm, skin-like texture, the direct result of operative treatment either through the canal or on the mastoid region as in the radical operation for the cure of chronic mastoiditis; or they are the regeneration of some part of the destroyed tympanic membrane. It is not the purpose of this paper to treat of those coming under the first class. They are, fortunately, of comparatively rare occurrence, due not alone to faulty technic on the part of the operator, but also to accidental traumatism, acid burns and similar causes. Nor are cicatrices of the membrana tympani by any means uncommon. The subject of this paper is the spontaneous re-formation of ear-drums that have been practically completely destroyed, and a careful search of the literature of the subject shows dearth of reports of similar cases. Three that have come under my observation are reported here:

Case 1: T. J., mechanic, a patient at the Polyclinic Hospital, 40 years of age. General health excellent. There had been a profuse discharge from the left ear since infancy, apparently not due to any of the exanthemata, though the exact origin of the trouble is unknown. He first came under treatment, which was of the ordinary routine description, about two years ago, and shortly afterwards the ear became dry. Suppuration occurred at intervals, but until six months ago no sign of regeneration had taken place. The membrana vibrans was entirely destroyed except a small ridge in the upper part of the canal covering the stump of the malleus. Hearing had greatly improved during the eighteen months of treatment.

He was absent from the dispensary for several months following this period, and on his next appearance it was found that the ear was still dry. A cicatricial membrane had formed from the remaining edges of the destroyed drum and in its normal position. In the center of this a small irregular perforation was still present, about one-fifth the size of the entire membrane. A small crust adhered

^{*}Presented as a candidate's thesis to the American Laryngological, Rhinological and Otological Society, 1907.

to the margin of this which, on being removed, left a raw edge. The middle ear was dry and devoid of granulations. He was kept under observation by weekly visits to the dispensary, but no treatment was instituted. The perforation continued, however, to decrease in size until shortly before the present writing it entirely closed. His hearing has remained stationary. The membrane is thin and essentially of a cicatricial nature.

Case 2: A patient in the Out-Patient Department of the Pennsylvania Hospital, 70 years of age, and of robust health and constitution. The left ear had been suppurating continuously for twenty years until about two years ago, when, under routine treatment the granulations in the cavity of the middle-ear disappeared and the suppuration ceased. He does not remember the exact origin of the disease but attributes it to a "cold." At the time of his first visit, the tympanic membrane was found to have been almost entirely destroyed a few ragged points at the circumference being the only remaining vestiges; a great part of the ossicles had also disappeared. The middle ear contained a small amount of friable granulation-tissue. He was discharged with a dry ear, and hearing for the watch at about six inches. A year later he returned complaining of a very much decreased hearing in the ear but no history of further suppuration. Examination showed that a membrane had formed across the canal, apparently slightly in front of the normal position of the drum. It was thick, strong and skin-like in texture, with, of course, no visible landmarks. In the center was a pin-point perforation which closed after two visits. The hearing was so poor that the watch was not heared on contact nor the whispered voice. This is his present condition.

Case 3: P. H., 35 years old, a private patient, has had a chronic suppurative otitis media for the past seven years, said to be the sequellum of influenza. When he first came under my observation about two years ago he had a central perforation of the ear-drum involving over four-fifths of its area, a few, low-grade granulations on the inner wall of the tympanic cavity, and a slight purulent discharge. He gave a history of arrest of the discharge several times in a few years, with its inevitable recurrence when any attempt was made under treatment towards closure of the perforation and an invariably aggravated loss of substance, until it was in the above described condition, when he first presented himself to me.

The discharge was readily controlled by routine treatment for a couple of weeks, and after that he was kept under observation, but nothing was done to induce a cicatricial healing of the tympanic

membrane. In a few weeks more, however, the perforation had entirely closed, leaving a cicatrix very similar in appearance to a slightly thinned and retracted, but otherwise, normal membrane. It was non-adherent and contained a small chalk spot. The hearing in this ear was poor for the whispered voice and negative for the watch on contact, but since the closure of the perforation it was steadily increased until at present he hears the watch at night several feet from his pillow and is using the damaged ear quite satisfactorily for the telephone.

The interest in this case lies in the fact that repeated attempts had been made to close the opening, each successive attempt resulting in further loss of tissue and a renewal of the discharge, while on the other hand there had been no tendency shown in the two years during which it was untreated towards spontaneous closure. At the end of this time, however, some fresh infection having again started active symptoms, the spontaneous cure began immediately upon the cessation of suppuration and proceeded to complete cicatrization with amazing rapidity.

These three cases have been reported on account of the length of elapsed time between the inception of the disease and the start of the reparative process, and also because the work was spontaneous and very slightly, if at all, influenced by treatment.

There are few spectacles more common, perhaps, in the treatment of aural disease than to see perforations of greater or less size close satisfactorily. The perforation made by the paracentesis knife will, under favorable circumstances, close completely in a few days at most, and often the greatest difficulty encountered is that of keeping it open for a sufficient length of time to allow proper drainage; small perforations occurring spontaneously and due to the rupture of the tympanic membrane from pressure of the fluid in the middle ear take a longer time to heal, but usually do so under appropriate treatment if seen before the damage done is great. Many, even with half the membrane gone, if there is no other intra-aural condition such as caries, will cicatrize completely; though the usual "cure" for a drum with so much of its substance destroyed consists of healing of the edges with a permanent perforation. This, indeed, is very often the most satisfactory ending of such a case, as the hearing is frequently still further impaired if the closure is complete.

Cases similar to the three quoted above, while perhaps not of extreme rarity, are of comparatively infrequent occurrence and seem to be worthy of note for several reasons. In each case, the disease

was of long duration; in one twenty, in the other forty, and in the third seven years. An ordinary cure, consisting of checking the discharge, soon followed the beginning of treatment, but in each case, the reparative process, once started, continued spontaneously to practically a complete replacement of the drum. The length of time from the beginning of the disease until the beginning of the reparative process and the great extent of the damage done are the important features presented.

That there is a tendency latent in all tympanic membranes to spontaneously effect a cure by the closure of any perforations occurring in their substance, will, I think, be admitted by all close observers of aural disease. Every aurist of experience will recall numerous examples of the difficulty, if not the impossibility, of effecting a permanent opening in a comparatively healthy ear-drum or even one that has been thickened by some inflammatory or other process.

McBride, speaking of the attempted inducement-of closure of perforations says: "In most cases such well intended efforts result in failures, while the establishment of a permanent opening in a thickened or normal membrane is almost impossible," and also that "perforations due to rupture, close quickly without treatment." And it is also a matter of common occurrence to find that the perforation made with the knife, even if it be, as it should, a large cut and not a mere puncture, will close with annoying rapidity in spite of pressure of retained fluid in the tympanum or the presence of a strip of packing, however skillfully placed in position. Perforations due to accidental traumatism come equally under this head.

On the other hand, a perforation once firmly established seldom shows a tendency towards healing while the discharge continues, and even after its cessation it is usually only in those of smaller caliber that a satisfactory cure is obtained. Politzer himself says: "Sometimes even after the space of a few weeks a great enlargement, rarely a decrease, of the perforation will be seen." He further says: "The closure of the perforation by cicatricial tissue depends neither on the duration of the discharge nor on the amount of loss of substance. In general, however, small losses of substance are more frequently closed by cicatrization than more extensive ones, but it is not every perioration that remains open for some time after the suppuration has ceased that may be considered as permanent, because occasionally, although not frequently, cases are observed in which the perforation cicatrizes several years after the suppuration has ceased. In a case reported by me, in which the

membrana tympani was destroyed with the exception of a narrow fragment at the periphery, a complete regeneration of the membrane took place without adhesion to the inner wall of the tympanic cavity."

When McBride says, as above quoted, that perforations due to rupture close quickly without treatment, we must conclude that he refers to rupture from pressure of contained serum or pus, which fluid and its cause also disappear untreated, for such perforations in my experience rarely heal spontaneously while the middle ear continues in a diseased condition. In other words the membrane, from a lowered vitality due probably to the diseased condition of the ear, loses its inherent tendency to heal the rent. Such healing when it occurs, must be due to the presence of healthy granulations on the edges of the perforation leading to cell proliferation, and the formation of fibrous connective tissue which is nature's method of healing by the formation of a scar.

This process, in the vast majority of cases in which there has been extensive destruction of tissue, is self-limited and ceases before the reformation of the drum, leaving the permanent perforation with healed edges usually seen in so-called cures of such cases. When there is a recrudescence of the active process, due to some new infection, the lowered vitality of the healed edge is insufficient to resist the micro-organismal attacks and the newly formed scar tissue melts away, and frequently the destructive process is carried into the remains of the previously healthy tissue, leaving an opening increased in size. Such is more likely than not to be the result of any operative interference with the view to closing the perforation. The technic of the procedure is to freshen and stimulate the healed edges in order to try and promote such healthy granulations. Infection naturally and inevitably results, and the scar tissue with decreased reparative power and deficient blood supply is much more apt to break down and melt away than to build afresh. For infection thus started cannot be readily controlled, and the possible introduction of a virulent culture of the pus-producing organisms may be more than the tissue, far from normal, will be able to take care of.

In the case of spontaneous closure of old perforations with healed edges, after suppuration has disappeared, sometimes for long peroids of time, the process must be quite similar. The healed edges must become re-infected, through some slight traumatism perhaps, with the consequent irritation, collection of leucocytes and the other phenomena of inflammation. If such inflammation is of just the

required degree of intensity to stimulate towards regeneration and not disintegration, we have the picture shown in Case 3, of a drum proceeding rapidly and uninterruptedly toward complete closure; if, on the other hand the resisting power of the existing scar is not great enough, not only does the perforation increase in extent, but frequently the remaining mucosa of the middle-ear becomes involved, resulting in a general infection of the entire cavity. That the process is frequently, possibly usually, reversed, and the primary seat of such infection is in the tympanum rather than on the edge of the drum, makes very little difference, as the process and the results are the same.

That in many respects a complete closure of a perforation is desirable cannot be doubted, as it minimizes the chances of just such an outbreak taking place. The mucous membrane of the middleear, never again as healthy as in its normal condition, is always exposed to fresh infection and recurrent suppuration from without through the unhealed perforation, while with a perfect closure the Eustachian canal offers the only mode of ingress for micro-organisms. Also the chance of exposure to cold and wet and other devitalizing influences is very much reduced. Of a permanent perforation, McBride writes: "On the whole, this is a less favorable result than cicatrization, because the mucosa of the middle-ear remains exposed and liable to a recurrence of inflammation," and later "on the whole, this must be considered a favorable outcome," but "the most satisfactory result is the formation of a non-adherent cicatrix." At first glance, and seen in this fragmentary manner, these quotations seem to be rather at variance. His meaning, however, is that the most desirable outcome is a completely protecting scar giving probable freedom from recurrence, but that, since this is seldom obtained in large perforations of long duration, a permanent opening with cessation of all discharge must be considered a cure.

And in spite of danger of recurrence of suppuration and further loss of tissue, this result is frequently the most satisfactory to the patient as well as to the aurist. For it is a matter of common experience that the hearing is much more frequently decreased than increased after the complete covering in of the tympanum has taken place. Politzer advises that the hearing-power be properly tested by closing the perforation with paper prior to an attempt at permanent closure; for while there is better protection with a complete membrane, there is often a serious reduction of the already impaired hearing, with the alternative danger of recurrent suppuration and consequent enlargement of the opening if the attempt at closure is

made. And McBride: "It is of great clinical importance to note that the hearing-power is not necessarily improved after the occurrence of cicatrization; indeed, it is sometimes worse than before." And, in fact, in view of the accepted theory that the function of the tympanic membrane is primarily protective rather than for purposes of vibration and transmission of sound-waves, this would seem to be the natural result—that the hearing-power should be lessened. With the chain of ossicles gone or broken or ankylosed, as it usually is in these long-continued cases, there is then no direct means of communication between the drum and the fenestra ovalis and the hearing-apparatus of the internal ear. The cicatricial drum is also often thickened and adherent in part or all of its surface, giving diminished sound-conducting qualities. And since it is chiefly a protective membrane, leaving this protective quality aside, it is hard to see why the hearing should be improved by its regeneration. With the ossicular chain intact and mobile, the mucosa in a normal condition, and a scar-tissue drum in approximately the normal position, it is quite conceivable that the patient would hear better than when one or more links of the chain are broken. However, such ideal conditions must occur rarely. That they may occur is equally certain, as is, I think, shown in Case 3, in which the hearing has quite perceptibly increased and is continually improving. In Case 1 it has remained nearly stationary, while in Case 2 it has been very markedly diminished. Where a perforation has not involved the ossicles and they have not been much affected by the suppurative process, hearing seems to be more often improved.

What effect the regeneration of an ear-drum has upon the bone-conduction of sound I am unable to determine. The tuning-fork placed upon the vertex of the skull after Weber's method is, of course, heard best in the affected ear, other conditions being normal, but this does not mean that there is any actual increase of bone-conduction on that side. Also, upon being placed over the temporal bone, posterior to the auricle, the fork is heard much more readily than at the external auditory meatus. It seems possible that there may be some compensatory increase of bone-conduction in these cases, including all those in which there is any impairment of the air-conducting apparatus, but this cannot be taken up in more detail at this time.

There is one other idea that is suggested by a study or these cases—the question of the amount of vitality possessed by the cicatrized membrane. In the three cases quoted, the ultimate healing took place after long periods of time since the beginning of the infec-

tion, and at least several months after the ear was practically cured (by the formation of a supposedly permanent perforation). It seems to be quite possible that the membrane, free from suppuration and its devitalizing influence, should become stronger and more capable of resisting fresh infection, and consequently that its power of regeneration should be increased.

The fact that so many attempts at closing a perforation should prove unsuccessful would seem to show that the membrane had not yet regained sufficient vitality to produce the desired result. May it not be quite possible that a cicatricial tympanic membrane regains strength and vitality steadily after the cessation of irritation from suppuration and if taken at the right time could be more successfully manipulated? If this be so, it would seem a wise measure to allow so-called permanent perforations to rest for considerable lengths of time before active interference, in the hope of thus obtaining more healthy tissues on which to operate, due attention being paid in the meanwhile to building up the patient's health. And the fact that some, if few, of these perforations do close spontaneously should be one reason more for conservatism. These observations are offered as suggestions, merely, of the possibility of obtaining more uniformly good results by a further study of this point.

To summarize, I would offer the following conclusions: I. Perforations of the largest size may, under certain favorable circumstances, close spontaneously and without adhesions, even years after the inception of the disease and the cessation of all discharge, as illustrated by the three cases offered above. 2. That there appears to be an inherent tendency in all tympanic membranes to heal, when the opportunity is given by the removal of the exciting cause. 3. That the reason for so many failures in restoring the continuity of the tympanic membranes is probably due to the lowered vitality of the tissues; and that by waiting before instituting active treatment and striving to build up the general health of the subject and improve the local condition, better results may possibly be obtained. 4. That the complete closure of a perforation is often of doubtful advantage, because of the decrease of hearing-power, although balanced by the better protection afforded.

2032 Chestnut Street.

PRIMARY TUBERCULOSIS OF THE MIDDLE-EAR.*

DR. CHARLES H. LONG, CHICAGO.

There is probably no disease to-day more widely discussed, not only by the physician, but by the laity as well, than the "Great White Plague." For many years it has claimed the attention of some of our greatest scientists. Koch's discovery of the tubercle bacillus in 1882 was of unprecedented value to the profession; and since that time, particularly during the last decade, marked advancement has been made in the knowledge of tuberculosis. While clinical research continues, efforts are exerted to utilize each progressive step for the enlightenment and benefit of mankind. While some theories have been so conclusively proved by experimentation and application that they have become of universal practical value in diagnosing cases and for the treatment and prevention of tubercular infection, there are still many questions open to discussion. Concerning these, we must accept the opinion of the majority until more extensive investigation and time shall prove or disprove them.

Before proceeding to the subject of primary tubercular infection of the middle-ear, which is the purpose of this article, let us take a brief survey of the present tubercular situation as it is presented to us by recent scientific workers and by personal study and observation.

There has been much disputation as to whether the human and bovine tubercle bacilli differ or are identical. Theobald Smith claimed to have found "many distinct differences." Koch1 believed the difference to be one of type, rather than species, the position now taken by all who support a differentiation between the two groups. Koch further stated his belief that this difference is sufficient to influence the combating of the disease. Others2 believe in the unity of the human and bovine bacilli, maintaining that, while there are marked differences in cultural growth and virulence between the two "so-called types," these types vary within themselves in the same way, to such an extent, that the difference in the groups overlaps, making it impossible to consider the one group as an entity distinct from the other. The English Royal Commission³ confirms this instability of type and concludes that the gap between the two types is not a wide one, while Whitla4 states that the conclusion of

^{*}Read at the meeting of the Chicago Laryngological Society, May 21, 1912.

the "great majority of recent workers is that the human and bovine types of bacilli are identical."

Whatever the decision in this regard, there is now a general agreement upon one point,-the danger to man of infection from both types of bacilli. The English Royal Commission, in their report of 1911, state as follows: "We have investigated many instances of fatal tuberculosis in the human subject in which the disease was undoubtedly caused by a bacillus of the bovine type, and nothing else. We have compared the lesions from such cases with those obtained from parallel cases of fatal tuberculosis in which the human tubercle bacillus alone was discovered. Except for the difference in the type of bacillus found in them, these two groups of cases presented similar features; the clinical histories of the cases were alike, the cases all terminated fatally, and the lesions examined after death were found to be anatomically indistinguishable." To quote Professor Ravenel:5 "Laboratory investigations have shown beyond question that bovine tuberculosis is transmissible to human beings and that the lesions produced do not differ in any way from those caused by human bacilli."

Considering these facts, is it then worth while to pause to discuss the much agitated question of the possibility of the human bacillus affecting cattle? It is interesting, and perhaps valuable, to know that the resistance of bovines is so great that the feebly virulent human bacilli can ordinarily have but little effect upon bovine tissue. This, however, seems not the salient point in the matter. When we observe the destructive inroads made by the bovine bacilli in the human being, does not the question of bovine susceptibility shrink into insignificance?

Again, in view of these facts, whatever its source,—water, milk, milk products, or ordinary dirt—the infection of mankind by bovine tubercle bacilli should receive our careful attention. Though the extent of danger is still in doubt, if we adhere to von Behring's⁶ theory of latent infection, if we incline toward a growing conviction, that, after all, the one type may be transformed into the other after long-continued residence in a particular host with all conditions requisite and favorable to such transformation, or if we advocate the popular theory⁷ that the surgical forms of tuberculosis are due to bovine bacilli, which may also produce miliary tuberculosis; in any case, we cannot but be convinced of the perils of bovine bacilli to mankind. We do not, as some accuse, "minimize" the danger of infection by human bacilli by emphasizing the work of the bovine type. We merely hold that the latter infection has a significance which may not be generally appreciated.

It is universally recognized that age is an important factor in the infection of tuberculosis. The disease is considered pre-eminently one of childhood. The physical conditions, environments, and food of the child render it practically impossible for children to escape the inception and harboring of the bacillus. Though its presence is not always immediately evident, the seed is sown and awaits only the opportune moment, favorable soil conditions and lowered resistance to begin its destructive activity. The prevention of implantation is one of the means of eradicating the tubercular evil.

We must, then, consider first the question of tuberculosis and the susceptible child. Though much is being attempted to better existing conditions, yet more should be done. We fail to see how civic governments can consider it unnecessary to improve the public milk supply in the face of such statements as the following made by the English Royal Commission: "A very considerable amount of disease and loss of life, especially among the young, must be attributed to the consumption of cow's milk containing tubercle bacilli."

It has been fully demonstrated that certain tissues of the human body exhibit a greater susceptibility for the tubercle bacilli than others. The lungs offer the best example of these, and, in consequence, are most frequently primarily infected. On the other hand, some tissues are so rarely invaded that many believe that their infection as a primary condition never occurs. To this latter class belongs the middle-ear. Although Milligan, after years of observation concludes that primary tubercular infection of this organ is a comparatively common condition, he meets with little support and much contradiction of opinion, some experienced otologists even maintaining that the infection is never primary, being always secondary to the disease elsewhere, usually with a pulmonary focus. While few assume this extreme position, yet the general consensus of opinion inclines toward the rarity of the condition, which is not surprising when we consider the limited number of cases reported and the great difficulties in eliminating early or latent tubercular infection.

Until the year 1903, according to Goldstein, ¹⁶ but three cases of primary infection of the ear had been reported. To these he added four. Recently others have been presented, and, although there may be doubt as to some of these being primary, the remaining unquestionable ones give sufficient proof of the existence of a primary infection of the middle-ear. Until it can be proved that some one part of the human system is immune to the invasion of the tubercle

bacillus, the possibility of this conditions cannot be authoritatively contradicted.

The following case which I have to report appeals to me as one of special interest in view of the extreme youth of the patient.

G. W.; English; aged 11 months; female. According to the parents, the child appeared to have a severe cold at the age of one month. Both nose and eyes discharged for a couple of days, which was followed by a discharge from the left ear. The family physician treated the ear for some time by syringing, but no improvement resulted. February, 1010, she was brought to my clinic at the Post-Graduate Hospital by the mother. Examination revealed a profuse fetid purulent discharge from the left ear. The lining of the external auditory meatus was red and irritated. The tympanic membrane was absent. The probe revealed necrotic bone. The examination of the throat showed enlargement of the pharyngeal tonsil, which seemed to interfere with nasal breathing. This was removed. In all other respects the child appeared perfectly health-The treatment applied consisted of ordinary cleansing and Politzeration until April. No improvement resulting, a smear was taken and submitted to Professor Zeit of the Northwestern University for examination. He reported the presence of tubercle bacilli in the discharge. Owing to the child's youth, it was impossible to determine the exact condition of the hearing, but it appeared little impaired. The cervical glands were not enlarged and there was no tenderness nor swelling over the mastoid process.

April 29, 1910: The radical mastoid operation was performed, only remnants of the malleus and incus remained. A mass of granulation-tissue virtually buried the stapes, the granulations extending into the antrum. All were carefully curetted away with the exception of those around the stapes. The post-auricular wound was dressed open. Owing to the rapid growth of immense, flabby granulations, healing was protracted and many curettements were necessary.

June 2, 1910: The post-auricular wound had healed and the meatus was dry. About the middle of May, the right ear was found to be discharging. Professor Zeit reported a pneumococci infection, but no tubercle bacilli. This ear was soon well.

October, 1910: The child was suffering from a cold, and both ears were discharging after being dry for four months. No tubercle bacilli were discovered, and the response was negative to both the Moro and you Pirquet tuberculin tests.

October, 1911: The last report of the case came at this time. Both ears were dry and, according to the mother, the child was in general good health. Up to the time I first saw her, this child had never been given cow's milk or artificial food of any description. She did not appear to suffer pain in her ear, while she was so noticeably good-natured that callers were impelled to remark about the attribute.

In our conclusion that this was a simple case of primary tuberculosis of the middle-ear, we considered the following: the child's youth at the period of onset of the disease; its continuous general good health; the absence of tubercular infection elsewhere, as proved by the negative tuberculin tests after the radical mastoid operation; and the ultimate satisfactory condition of the ear.

As to the source of the disease, little need be said, although the child, to the best of our knowledge, was given no cow's milk or artificial food. The ignorance and carelessness of the laity afford ample opportunities for infection. The theory of predisposition and inherited tendencies was not regarded here, as there had been no instance of tuberculosis in the family and the parents of the child were in perfect health. The case being a surgical one, suggests a bacillus of the bovine type and the attack a result of dirt infection.

While there are many possible avenues for the inception of the disease, the features of the case eliminated all but two, the Eustachian tube and the external auditory canal, with the probabilities in favor of the former.

The examination of the ear discharges determined the nature and localization of the disease and the radical operation was performed in time to arrest its destructiveness. In support of this operation, which is often criticized, we maintain that if any operation is advisable, it should be of a radical nature, especially when the disease is localized. Surgeons have regretted its omission when further developments showed that its timely performance might have prevented a fatal termination of the disease.

Despite the constant advice to be ever upon the alert for the first indications of the tubercular disease, some of us fail to recognize the infection in its incipient stage. If the physician and bacteriologist would more frequently co-operate, there would be fewer disappointing results. While this reference is but an added stroke to the well-worn nail, its insertion may be of benefit to some co-worker.

Let us not slumber while the foe invades; then become pessimistic, but "take arms against a sea of troubles, and by opposing, end them."

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15 East Washington Street.

Surgery of the Thymus Gland. PARKER, Am. Jour. Dis. of Child., Feb., 1913.

A very instructive paper written on a subject of which little has been known and of particular interest to the laryngologist. Many sudden deaths have been caused by an enlarged thymus producing obstruction to the trachea. Frequently this is the sole factor responsible for the compression, but at times enlarged tracheo-bronchial glands or spasm of the glottis are contributing factors in producing fatal results. Compression of the trachea is shown at autopsy by the presence of flattened trachea, associated with enlarged thymus and revealed intra-vitam by the bronchoscope, showing narrowing lumen of the trachea. The three most important symptoms are permanent dyspnea, recurring suffocation attacks and stridor; all three of these frequently occur together. Treatment is essentially surgical.

FOREIGN BODY IN LARYNX AND TRACHEA REMOVED BY THE AID OF THE SUSPENSION LARYNGOSCOPE.

DR. SAMUEL IGLAUER, CINCINNATI.

The following case is reported because of its intrinsic interest and also because it is one of the first, if not *the* first case, of the removal of a foreign body from the larynx and trachea by the aid of suspension laryngoscopy.

Patient, M. P., female, aged 5 years, of Glendennin, W. Va., referred by Dr. G. A. Hinnen and Dr. J. Moore, of Charleston. The child suffered from cough, frequently associated with choking spells. During the past five days there had been considerable difficulty in swallowing.

Previous history:—About the middle of January, 1913, the child suddenly choked on a piece of a safety pin, which she had in her mouth. Her mother attempted to extract the pin with her finger and could feel it in the throat, but was unable to remove it. There was no further trouble until early in February, when the patient had a severe choking spell associated with extreme cyanosis and lasting about two minutes. A few weeks later there was a similar attack without any special trouble in the intervals. On several occasions the child has expectorated small streaks of blood and about five days ago the first trouble in swallowing was noticed, since which only liquids could be swallowed and some of these regurgitated from the mouth. The patient lost weight and quite recently had fever.

Present conditions:—The child is well-developed and well-nourished. She is rather hoarse and suffers with marked inspiratory as well as expiratory dyspnea. The resonance of the right chest is dimininshed but air enters both lungs freely. While under examination the child had a severe paroxysm of coughing associated with considerable cyanosis and the expectoration of muco-pus. On attempting to swallow water some difficulty was noted. A radiogram (Figure 1) taken by Dr. Lange shows a broken safety-pin (minus the pin portion) lodged in the trachea. The spring portion of the pin projects slightly into the larynx.

Operation, June 14, 1913. One-eighth grain codein, and 1/400 grs. of atropin were administered hypodermically, followed by chloroform anesthesia. Owing to the dyspnea the anesthetic was administered with considerable difficulty. A suspension laryngoscope introduced into the larynx immediately revealed the spring of the pin projecting above the vocal cords. While holding the lar-

yngoscope with one hand (without hooking it up) the foreign body was seized with forceps and with a slight rotary motion it was set free and extracted. A slight hemorrhage followed. The recovery was uneventful, except for the fact that the child vomited a large, living, round worm on the evening of the operation.

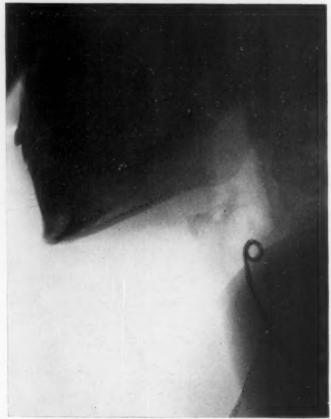


Figure 1. Radiogram showing a broken safety-pin in the larynx and trachea of a child 5 years old. The patient's shoulder is raised, interfering somewhat with the view of the clasp of the pin.

The pin measured 15% (4 cm.) inches in length, and owing to its six months' sojourn in the air-passages, was partially encrusted with lime salts.

In this particular instance the suspension laryngoscope proved to be a very valuable instrument.

Lancaster Building.

DIRECT LARYNGOSCOPES.

DR. CHEVALIER JACKSON, PITTSBURG, PA.

The first form of laryngoscope used by me was modeled after the original Kirstein "autoscope" which had its transverse greater than its vertical diameter. I attached a double handle to a simple oval tube with half its periphery cut away for the distal two-thirds of its length. Then, after Killian created bronchoscopy, I added a slide at the side for bronchoscopy. Both of these laryngoscopes were used with the ordinary head-mirror, and with the Wendell C. Phillips head-lamp worn between the eyes. As I found the oval

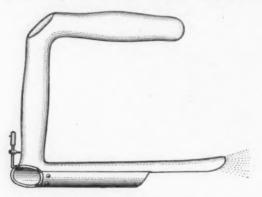


Figure 1. Form of the original Chevaller Jackson laryngoscope with Einhorn light carrier added.

lumen less convenient than the round for working at the side instead of over the dorsum of the tongue, as I frequently wish to do, I abandoned the oval lumen for the round lumen with the slide at the side. As the edges of the slide in this position became rough in use, they occasionally cut the patient's lips, so that the slide was moved to the top and in this form, with the addition of the light carrier of the Einhorn esophagoscope, it has been in general use ever since. Recently some men who have done me the honor to work with me, have found the oval model so convenient for the introduction of esophagoscopes, bronchoscopes, and especially intratracheal insufflation tubes, that it has been deemed worth while to resurrect the oval model. The slide can be left off altogether and

thus removal of the laryngoscope after introduction of tubes of all kinds is facilitated as in the Dickinson speculum. The oval lumen giving a larger field has the additional advantage of facilitating the identification of land-marks and of affording more room for endolaryngeal operations. Probably many operators will prefer working through the oval laryngoscope to the method that has seemed easiest to me: namely, using the round lumen laryngoscope for vision only, the forceps and other instruments being passed alongside the laryngoscope.

Reorganization of the Septal Cartilage Following Submucous Resection. M. Al. Ssamoylenke. Zeitschr. f. Laryngol., Vol. 6, No. 1, April, 1913.

As none of the writer's patients was scientifically enough inclined to sacrifice a portion of his nasal muco-perichondrium one year after the performance of the submucous resection, the respective microscopic specimens had to be taken from the cat. The most striking result of the experiment is the establishment of the fact that the perichondrium produces a proliferation of connective tissue. Neither the perichondrium nor any remaining portion of the cartilage produce cartilaginous fibers that show a tendency to replace the removed cartilage. The field of operation becomes transformed into a mass of scar-tissue. The preservation of the perichondrium is not a condition sine qua non for the success of the operation, as the same kind of scar-tissue originates from the mucous lining. The writer pleads, however, for the method of perichondrial conservatism; the mass of scar-tissue between the adjoining mucous linings would compress and destroy the numerous glands of the Schneiderian membrane, that are protected by the intervening perichondrium.

Fein, of Vienna, and others claim that a perforation is not condemnable, but desirable. The writer of this article proves that the preservation of the perichondrium is not a necessity—but a luxury. The time does not seem so far when some rhinological "Cubist" rips a big hole into the septum, while the cartilage removed is vested in a toga of perichondrium; and he will be able to prove that this is real submucous art, while a skillfully performed operation is a relic of the fossil days of rhinology.

GLOGAU.

SOCIETY PROCEEDINGS. NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

Regular Meeting, January 22, 1913.

JOHN F. McCoy, CHAIRMAN.

Presentation of Specimens Showing Probable Etiological Relation of Sphenoidal Sinuses to Some Cases of Tic Douloureaux, DR. WILLIAM HENRY HASKIN

In studying the sphenoid sinuses in many bones, the writer has been impressed with the frequency of its intimate relation to the fifth nerve and the possibility that disease of these sinuses may be a cause of trifacial neuralgia, at least in some cases, seems to be very probable, although he has been unable to find any description of such cases in the very complete indexes of The Lakyngoscope, the Annals of Otology and the Index of Oto-Laryngology.*

That disease of the optic nerve is frequently caused by disease of the sphenoid and posterior ethmoid cells, is a well recognized fact and there is an increasing record of such cases being cured by treatment of these sinuses. An examination of the specimens presented will show that in most of them the second branch of the fifth nerve, i. e. the superior maxillary branch as it passes forward from the Gasserian ganglion and escapes from the foramen rotundum into the pterygo-maxillary fossa, is separated from the sinus by a very thin partition of bone, and in many instances lies in a distant groove on the sinus wall. In several of the specimens the sinus extends outward beneath the nerve-groove for more than half an inch. In ten of the specimens the sinus can also be seen in direct contact with the foramen ovale, through which the third or inferior maxillary branch escapes from the cranial cavity, its motor branch lying in contact with its posterior wall. As the first or ophthalmic branch lies on the outer wall of the cavernous sinus, it does not appear to come in contact with the sphenoid, although Onodi has recently described such a relationship. This clearly shows how intimate is the relation of these sensory branches with the sinus, and the following will show that the large motor and sympathetic branch of the second division, i. e., the Vidian-which leaves the facial nerve in the hiatus Fallopii and passes inward under the fifth nerve to reach the Vidian canal, through which it passes forward to escape into the pterigo-maxillary fossa where it joins the second sensory branch and the spheno-palatine, or Meckel's ganglion-also lies in very intimate relation with the floor of the sinus.

^{(*}N. B.—Since doing this work, the writer has learned that Dr. Sluder has observed the same conditions in an article in the Transactions of the American Laryngo orical Association, which appeared about January 10, 1912.)

It can frequently be seen as a distinct rounded ridge, the top of which the writer has opened in several of the specimens.

Dr. T. J. Harris, who has recently returned from abroad, tells me that the younger Onodi, who is still a student, has recently published a paper on these relations, but the writer doubts the correctness of some of his observations and will report later after studying a series of wet specimens.

It is well to mention also that the sphenoid sinuses derive their nerve supply chiefly from the second division of the fifth nerve, for disease of the sinus would probably affect these nerves at any rate.

Specimens 19, 33 and 86 present undoubted evidences of disease which has caused the osteophytic formations. The writer has examined several hundred sphenoid sinuses, and is convinced that in over 90 per cent the nerve will be found to be in direct contact with the sinus. The specimens presented have been selected, however, to show the most marked relations, but they are from the writer's collection only, which is a small one, comprising about 100 sinuses.

The writer has had no clinical experience with true cases of trifacial neuralgia, and in presenting this short paper does so in the hope that the possibility of sinus disease being a cause of the neuralgia may prove to be a fact if only in a few cases, for the treatment of the sphenoid sinus is a comparatively simple procedure compared with the radical operation for resection of the nerve itself. Again, tonic and clonic spasms of the motor branch of the fifth nerve are very distressing conditions, the cause of which is described in the text-books as being very indefinite—in fact unknown. The undoubted relation of the Vidian nerve (which is the motor supply of the second branch of this nerve) to the sinus may help to clear up the diagnosis in some obscure case of motor spasm of the palate.

Dr. Sluder describes several cases of sphenoid disease where relief of pain was obtained by treatment of the sinus wall. The writer believes that many of the obscure symptoms can be attributed to involvement of the sympathetic nerve supply. Each branch of the fifth nerve receives sympathetic fibers which are derived from the carotid and the cavernous plexuses. Disease of the sphenoid would affect these plexuses, in all probability, and give rise to many of the symptoms which in reality are due to the sympathetic nerve supply.

DISCUSSION.

Dr. Smith said that the only point in which Dr. Haskin seemed to disagree with Onodi and Sluder was in regard to the involvement of the sixth nerve. In Sluder's article published in the American Laryngological Association Transactions, 1912, he claimed that the third, fourth, fifth and sixth Vidian nerves were implicated in empyema of the sphenoid. He called attention to the fact that neuralgias frequently occurred even after the sphenoidal empyema had ceased and where a large permanent opening remained in its anterior wall. He also called attention to the neuralgias subsequent to ethmoidal, frontal and maxillary sinus involvements. Dr. Smith said that he himself had observed this in many

of his cases, but had attributed it to a periostitis rather than to involvement of the nerves, and he was glad to be able to formulate a more correct opinion concerning the etiology of these post-operative pains. Sluder confirmed his suppositions by injecting a solution of cocain into the sphenoidal sinus and stopping the pain. He also found that a five per cent solution of salicylic acid will act in the same way. He demonstrated that the larger the sphenoidal cavity the smaller the fissure through which these nerves run, and conversely the smaller the sphenoidal cavity the larger this fissure. Thus tending to demonstrate that an involvement of a large sphenoidal cavity might have its inflammatory condition extend sufficiently far outward to take in the sixth nerve. Dr. Smith said that he was very appreciative of having had demonstrated to him the many vagaries of conformity both in the sphenoidal, ethmoidal and frontal sinuses as had been shown by Dr. Haskin.

Dr. Douglas said that the anatomical point made by Dr. Haskin seemed to be the only one under discussion. That neuralgia of the fifth nerve arises from disease of the sinuses is not perfectly true. It is also perfectly true that after many brilliant operations on the sinus the pain continues. Such cases have often given him much trouble, and he had reached the conclusion that these cases have suffered from a certain sort of ostitis before and after the operation which does not subside. Most men have encountered such cases in the frontal sinus and in the antrum. It is unquestionably true that neuralgia of the second branch of the fifth nerve may arise from disease of any of the sinuses which come nearly in contact with it-this, of couse, through the antrum and sphenoid. The proof is very clear as this nerve has a close relation to these two sinuses. It is not in accord with his experience that suppurative disease of the sphenoid or of the antrum give rise to much disease of the other nerves. It is only where a deposit or infiltrate has occurred that the other nerves are involved-the second, third, fourth and sixth. He had seen these involved in sphenoidal sinus disease, and had seen the second branch of the fifth nerve involved in sphenoidal disease as well as in antrum disease, but always more especially when the character of the lesion was a deposit or growth rather than inflammation. Dr. Haskin had showed a very interesting specimen in which he said that the antrum was tiny and the superior maxillary was invaded by the posterior ethmoid cell to make a second sinus in the maxilla. His presumption was that the septum between the two was an ethmoidal bone septum. Dr. Douglas thought differently, but it hardly seemed fair to discuss the specimen, for it was incomplete. In his opinion there was a true maxilary antrum divided by a septum, and not an anterior ethmoid cell.

DE. CARTER inquired whether Dr. Haskin considered the deformity shown in many of the specimens presented as being a deviation in the anatomical conditions, or whether they were pathological, that is, due to a proliferating periostitis.

Tracheal Obstruction Due to Thymus Enlargement: Skiagraph. Dr. John E. MacKenty.

The patient came to the clinic about a month and a half ago, with practically the same condition shown to-night. The child was breathing

with considerable obstruction and was very anemic. It was normal at birth, but shortly after birth it began to lose weight, and this condition progressed until mercurial inunctions were given, after which the child recovered its health.

In August, 1912, the child was intubated for diphtheria. Following this the obstructed breathing was noticed. The tube was worn for six weeks. The radiograph shows distinctly thymus enlargement.

It was his intention to use the bronchoscope to determine positively the nature of the obstruction but the parents refused to leave the child in the hospital. Therefore it was doubtful if the obstruction was due to thymus pressure or to intra-tracheal stricture. The physical examination of the chest showed in right bronchus partial obstruction which was a point in favor of thymus pressure.

Atresia of the Pharynx; Operation; Polypoid Degeneration of Mucosa: Recovery With Good Function. Dr. John E. MacKenty.

Dr. MacKenty said that the patient had first come to him two and a half years ago from Dr. McCullagh, at which time he had published a new operation for atresia of the pharynx. The girl had not breathed through her nose since childhood, the obstruction being probably due to an attack of scarlet fever. When she first came under observation the nose was filled with scabs. The operation which was done relieved her breathing entirely, in spite of the fact that her palate lies against the posterior pharyngeal wall. Some of the men who examined her did not think there was any opening, but one could be demonstrated which would admit the second finger with ease. This is a proof in favor of the operation devised by Dr. MacKenty, and shows that a cure can be effected in such cases in spite of the fact that the palate lies all the time during the healing process against the posterior pharyngeal wall.

An interesting fact in this case is that following the operation her nasal mucous membrane began to hypertrophy, and after a few months a polypoid degeneration developed which had to be treated. The inferior turbinate was so enlarged that it almost completely obstructed the nose. Now the mucous membrane is functionating again and has become practically normal, and she has a very good functionating nose. This case shows that the mucous membrane of the nose which had never functionated had become over-stimulated and had degenerated, but becoming accustomed to the new condition of things, had eventually become normal. She has had no contraction of the pharynx and it seemed only fair to assume that the function will remain just as shown, giving her a sufficiently large opening for normal breathing.

In reply to a query from Dr. Quinlan as to whether there was any obstruction before the intubation Dr. MacKenty answered in the negative.

DISCUSSION.

Dr. Cocks said that Dr. Law was certainly to be congratulated for securing the excellent skiagraph showing the thymic enlargement so clearly. It is exceedingly difficult to get a good plate of the thymus gland. He then told of a case seen in Dr. Chappell's clinic, where a child was

sent to a well-known x-ray man who took a plate which looked like a good one, yet no thymus enlargement was shown. The child was 2 years of age when the plate was taken. It is interesting to compare that plate with Dr. MacKenty's. Warthin states that the heart and great vessels in a normal child form a shadow which looks like a flask—the body of the flask is represented by the heart, while the narrow neck is represented by the great vessels. The thymic enlargement in Dr. MacKenty's picture is shown by the widening of the shadow corresponding to the neck of the flask. Warthin, Satterlee, Chevalier Jackson and others have reported thymic enlargement shown by the x-ray.

The influence of status lymphaticus on diphtheria and other infections is very interesting. Daut states that in a series of patients dying from diphtheria over 25 per cent had status lymphaticus. He states that "distinct modifications of the clinical picture of the disease (diphtheria) were present in these cases. In some instances the patients had a hoarse parking cough and a hoarse voice associated with attacks of spasmodic suffocation, weakness of the heart, and rapidity of the pulse. These attacks were altogether out of proportion to the severity of the membrane formation as shown post-mortem. In other cases, the patients died suddenly, having shown no unusual symptoms during life referable to status lymphaticus." It would be a great chance if Dr. MacKenty could obtain permission to operate upon this patient. If it could be proved that the tracheal obstruction was not caused by the obstruction of the larynx itself, it would be a great opportunity to make an incision and pull up the thymus gland, and remove part of it or anchor it to the end of the sternum.

Dr. Haskin said that Dr. Cocks had spoken of Dr. Chevaier Jackson's work. To his own knowledge Dr. Jackson had operated on ten cases. The chief difficulty has been the danger of death from suffocation, which Dr. Jackson has overcome by putting in a tracheal tube, and so averting any possible spasmodic contraction of the trachea and death of the patient. The cases had made wonderful recoveries.

Dr. Carter said that in 1904 he had a case of enlargement of the thymus gland, terminating in death. It was a very interesting and instructive case. The patient was a child, 5 weeks of age, and was brought to the hospital in a cyanosed condition, with difficulty in inspiration and expiration. It was evidently at the point of death, and immediate tracheotomy was performed, but without relief, for the tracheotomy tube was not long enough to reach beyond the constriction and the child died from strangulation about thirty-six hours after the tracheotomy.

Now Dr. MacKenty's case, from the general history and appearance of the patient, would seem to be due to some cicatricial constriction in the trachea itself. The general appearance of the case did not seem to indicate thymic enlargement. When a thymus causes asphyxia it does so by pressing on the trachea opposite the manubrium at a point corresponding to the second dorsal vertebra. This space is very small. The thymus increases in size up to the second year and symptoms of pressure are more apt to develop during the first two years of life. In the case

which he had referred to, the thymus was very large and the constriction of the trachea was very great. In one case operated upon by Rehu the thymus was lifted up and stitched to the anterior part of the sternum. The patient recovered.

From a mechanical point of view the two chief causes of death are asphyxia—which occurs when the enlargement of the thymus is chiefly in an antero-posterior direction—and syncope due to pressure of the gland on the great vessels of the heart, chiefly the pulmonary artery. In these instances, the enlargement of the gland is chiefly downward. Many sudden deaths in infants, and in some cases where the patient dies suddenly in the first stages of anesthesia, are caused by thymic hypertrophy.

DR. MACKENTY said that it had been his intention to take the child into a hospital and perform a bronchoscopy to determine whether there was a tracheal obstruction. He was not yet sure that it was not an intratracheal condition, but one point which inclined him to think otherwise was that the physical signs suggested pressure on the left bronchus. If the pressure on the left bronchus was sufficient to partially obstruct it then he was inclined to favor the view that it was due to thymus obstruction and not to contraction of the trachea. He had also intended, if the thymus were at fault, to pull the thymus upward and if practicable remove it, or at least to bring it up into the neck to relieve the pressure, but the parents had objected to any manner of operative procedure.

Some of these cases have been relieved by x-ray treatment. He intended to try to induce the parents to bring the child back to the hospital and have it undergo treatment by Dr. Law.

Case of Hodgkins Disease With Pressure Symptoms on Larynx and Esophagus, DR, WILLIAM A. SCRUTON.

Female, aged 35. Family history, negative. Personal history, Russian; general health excellent up to the past year, during which there has been an increasing loss of weight and consequent weakness. Twelve years ago while having trouble with the teeth, swelling appeared on right side of neck and pus was finally discharged. Nine years ago moderate hypertrophy of glands on right side of the neck was again noticed. The condition remained quiet until one year ago when the hypertrophy became active and has progressively increased. X-ray applications ineffectual.

Examination: Markedly asthenic appearance; skin is dry and of a peculiar color suggestive of bronzing. Large, tense, deeply seated mass at the anterior border of the sterno-cleido-mastoid muscle, midway between the upper and lower attachments of same; right side of neck. Numerous small glands can be freely rolled under the finger; they are situated in the anterior and posterior triangles of either side of the neck. The superficial glands elsewhere are not palpable. Examination of mouth shows the right tonsil hypertrophied and inflamed, displaced forward and inward by a mass which bulges the lateral pharyngeal wall to an extent seriously interfering with deglutition. Respiration labored when there is slight exertion.

Chest examination: Fluid right side, aspiration produced a clear straw-colored fluid which the laboratory pronounced sterile. X-ray shows

no hypertrophy of the glands in the mediastinum. No hypertrophy of liver or spleen noted.

Blood examination: Several examinations were made; the following is typical: Erythrocytes, 6,376,000; Leucocytes, 9,000; Hemoglobin, 80 per cent; large mononuclear lymphocytes, 6 per cent; small mononuclear lymphocytes, 13 per cent; polynuclear neutrophiles, 81 per cent; Wassermann reaction, negative in each of two tests.

Dr. J. G. Callison, pathologist at the Manhattan Eye, Ear and Throat Hospital, reports on specimen of gland removed from neck as follows: "In this tissue the typical structure of a lymph node is lost, although the number of lymph cells is not markedly reduced. With the loss of structure there is a considerable degree of fibrosis present. The tissue also contains a number of eosinophil cells of the type appearing in Hodgkin's disease."

I believe the tissue shows sufficient of the changes present in Hodgkin's disease to justify such a diagnosis. Dr. W. G. MacCallum, professor of pathology in Columbia University Medical School concurs in this opinion. The patient has been in the hospital ward twice. The duration of each occasion being about two weeks. The temperature invariably showed an afternoon rise to an average of 101.5°; on one occasion it reached 102.5° never higher.

This woman has passed out of my control, but when last seen was failing rapidly. Complained then of increased weakness, dysphagia and dyspnea.

Dr. H. D. Rolleston in *The Practitioner*, 1911, gives the following prognosis.: Death usually results within three years, due to pressure on vital organs (trachea, bronchi or great vessels) or to toxemia, anemia or asthenia. A secondary infection with tuberculosis may also terminate life."

DISCUSSION.

Dr. Doublas accepted the diagnosis and said that he would like to call attention to his own recent treatment of some of these cases, in which marked improvement had resulted from the administration of diphtheria anti-toxin. In some instances the glandular swellings had disappeared and in others had markedly improved. The improvement, however, did not last. Experiments are now being made with another serum in the Post-Graduate Hospital, and so far the reports are very satisfactory, but would require much testing.

Dr. Lederman asked if repeated injections had been given; to which Dr. Douglas replied that only small immunizing doses had been given.

Dr. Mackenty said that an interesting point was the differentation of the diagnosis between Hodgkin's disease and sarcoma. He had had two cases of sarcoma which clinically resembled it. It was often difficult, however, to make the diagnosis even after pathological examinations had been made.

Dr Dwyer said that he had an opportunity of seeing the specimens of tissue and the difficulty of making the diagnosis in the first instance was due to the fact that the first specimen was practically structureless be-

ing simply broken-down and degenerated glands showing no characteristics of any kind. The second specimen showed the characteristic of Hodgkin's disease, although the eosinophilia was not as marked as usual and on the whole the growth would be considered an atypical one.

Regarding treatment, Dr. Dwyer said he would advise a trial of colloidal copper, as this was the agent they were using for malignant growths at present and this condition, so far as we know, is rather allied to these growths. The results from the use of collodial copper have been rather encouraging but the series was too small and the time elapsed since treatment too short to judge of any permanent results.

Dr. Scruton asked for suggestions in regard to the treatment of the case. Should the patient be allowed to die without doing anything, or would it be well to attempt to remove some of the disease and keep her alive for a while. He was afraid that if she were put under an anesthetic the effect would be fatal.

Case of Sarcoma of the Antrum. DR. BEAMAN DOUGLASS.

Dr. Douglass said that it was only two months since he had operated in this case, and he believed that the man might be considered well. It was a small, round-celled sarcoma which involved the antrum, the sphenoid, and the ethmoid. The operation was done without tying the carotid artery, and it recurred immediately. Two weeks later another operation was performed, and the recurrence entirely removed, and he felt confident that the case might be considered cured. It was now two months since the last operation. The carotid artery was tied, the nose split, and the entire maxillary bone removed.

Epithelioma of the Soft Palate. Dr. BEAMAN DOUGLASS.

Dr. Douglass said that this was another interesting malignant case of the right soft palate, involving the anterior pillar of the fauces. The diagnosis of epithelioma was made by the microscope. The growth was removed two months ago by a radical operation, after tying the carotid artery. He believed that this case also might be considered entirely well. He might be unduly optimistic, but he felt convinced that the patient might be considered cured. There was no question in regard to the correctness of the diagnosis in either of these cases.

DISCUSSION.

Dr. Smith said that it was farthest from his desire to cast a shadow upon the supreme optimism of Dr. Douglass, but that he had never seen a case of sarcoma of the nose involving the ethmoidal region which did not recur after operation, irrespective of the apparent small extent of the involvement at the time of examination. He thought it possible that the present retrograde movement of the malignant involvement was in part due to the fact that the nourishment of the tumor had been cut off by the ligation of the external carotids. In the case of epithelioma of the palate he thought there seemed to be too much induration and inflammation adjacent to the wound to claim that recurrence was improbable. He said that six or seven years ago he had himself had a case of epithelioma of the palate upon which it was necessary to operate three times, and at the last operation the entire soft palate and lateral

pharyngeal wall of the right side had been removed. He had shown this case at two different periods to the section, the first time some months after the last operation and the second several years after it. After that he had followed the case for at least five or six years and there had been no more recurrences. The man's profession was that of a cooper, and it was necessary for him to blow into the bunghole of the barrel to see if the barrel was air-tight. For a long time after the operation he was unable to do this owing to the fact that the air would escape through the nose, there being no prevention by means of the soft palate. But nature had after a while met all the requirements of the case by excessive hypertrophy of the posterior tips of the turbinates, and he was able to resume the full functions of his calling. Dr. Smith said that it seemed too soon to assume that a cure had been effected in either of the cases presented by Dr. Douglass.

Dr. Lederman said that he wished to offer a word of encouragement to Dr. Douglass, for he himself had had a somewhat similar case, a man, 26 years old, in whom he had injected Coley's serum a number of times, which brought on a decided reaction at each treatment. He had later turned the case over to Dr. Dawbarn, who was at that time testing his operation of starvation by ligating the external carotid arteries. The growth receded probably a third, if not more, after the double ligation. This growth had extended into the antrum and posteriorly into the pharynx, involving the spenoidal sinus on the left side. A radical operation was done later and the whole left superior maxillary bone, part of the spenoid and ethmoidal cells were removed; it was a very bloody operation in spite of the ligation of the carotids. The man made a good recovery, and seven or eight years after the original operation the growth had not recurred. The diagnosis (small round-celled sarcoma) was made by the microscope. This man was afterwards fitted with an artificial palate and upper faw, and got along very comfortably.

Dr. Smith said that the Dawbarn operation consisted not in the ligation of one but of both external carotids, and the shutting off of all the blood-supply above the ligation. That if only one carotid was tied, the circulation would take place from the opposite side. He said that the injection of Coley's serum unquestionably created a fibrosis in malignant tumors which tended to lessen hemorrhage. That in a case of sarcoma recently under his care Coley's fluid had been employed for a long time and that a major operation for removal of the growth, not for the purpose of cure, but for the relief of pain, had resulted in very much less hemorrhage than in an operation several months prior for the removal of a specimen for examination.

Dr. Mackenty said that he had operated in many cases of sarcoma and those that had ultimately recurred were very few. One case recurred after five years, and during that time the patient was apparently perfectly well. The disease was evidently dormant during that time. It is common for sarcomas to remain apparently well for twelve or fifteen months after operation, or longer. One extensive case of sarcoma in a child was recalled by what had been said of Coley's serum. The child was in an inoperable condition and developed an attack of ery-

sipelas, and a month or six weeks later the entire mass had disappeared. it subsequently returned and proved fatal.

He was not at all optimistic in regard to the non-recurrence of sarcomas, for he regarded them the most malignant tumor we have to deal with.

Dr. Simpson said that his experience showed that these tumors almost invariably recur, even though this may be delayed for some time. There must be an interval of at least a year before beginning to hope they are cured.

Dr. Cox said that his experience, like that of the others who had spoken, inclined him to believe that one must expect recurrences almost always. A case may go on well for a time, but there is usually a recurrence. There have been some notable exceptions, and he recalled one case which he operated upon about seven years ago. The patient was a young man of about 17, with a sarcoma of the tonsil, which was removed. The glands of the neck were also involved. The pathologist pronounced the tissue from both tonsils and glands to be sarcomatous without doubt. The young man, however is still well to-day, and seems strong and healthy, with no evidence of a return of the growth.

DR. HURD told of a case of adero-sarcoma on which he had operated a year and a half ago, with no recurrence to date, but he did not feel at all optimistic and would not be surprised at a recurrence. He had cut cut every bit of the gland-bearing tissue except the vestibule and left frontal sinus, and cleaned out the bone thoroughly. It all filled with connective tissue and the patient has a fairly good functionating organ.

Two years age he saw a young man who had had a growth in the ethmoidal region. He probed through the brain for an inch and operated through the orbital roof, doing practically the Killian operation. The growth in the nose was cleaned out thoroughly and flush with the dura, and one could go through the frontal lobe of the brain for about an inch. The tissue was examined by Dr. Jonathan Wright, who said positively that it was not syphilis and was probably sarcoma of the brain, but the young man is still alive and apparently healthy. One can see a few nodules in the nose apparently healed-over granulations. He has never had syphilis, but for precaution had been on anti-syphilitic treatment for a year.

Dr. Carter said that he was convinced that the number of recurrences in cases of malignant diseases would be greatly reduced if it were generally borne in mind that the tumor itself should not be cut into or in any way injured before the operation. The incision should always be made wide of the area affected by the disease, for if the growth itself is cut into, the cells are quickly carried beyond the affected area by the lymphatics and blood-vessels—this accounts for a great many recurrences.

(To be continued.)

BOOK REVIEWS.

The Practice of Dentistry. A Practical Treatise Upon the General Practice of Dentistry, Operative and Prosthetic, Exclusive of Orthodontic Practice. By Leo Greenbaum, M. D., D. D. S., and Max Greenbaum, D. D. S. Philadelphia. Pp. 836, with 350 illustrations. D. Appleton and Company, New York and London, 1912. Price, \$6.00.

This practical treatise on general dentistry exclusive of orthodontic practice has been designed to meet the requirements of the active practitioner who often fails to post himself on the recent research and advanced methods, because he has neither the time nor the inclination to study the stereotyped text-books intended for beginners in dentistry.

The authors have spared no efforts to present in this volume an exhaustive yet concise record of the accepted advanced standards of dental practice.

The book is divided into two sections, the one comprising twenty-four chapters on operative dentistry, the other twelve chapters on prosthodoutia.

The sub-classification is excellent, the typography and illustrations admirable, and the subject-matter is presented in terse form. This book is distinctly a credit to the authors and to the publishers.

A Modern Treatise on the Legal Rights, Duties and Liabilities of Physicians and Surgeons. By Hugh Emmett Culbertson, of the Ohio and New York Bars, Contributing Editor to the Lansing, Ohio, "Encyclopaedic Digest," Notes on the American Decisions and Reports, and many other legal publications. Lea & Febiger, Philadelphia and New York. 1913. Price, \$3.00.

This treatise is written by a lawyer of experience and one who has an intimate association with medical men and medical practice. It deals with the duties, rights and liabilities of medical men toward the public as settled by law, and also of the legal relations of the regular profession to the practitioners of the many other schools now in vogue.

It is the duty of every doctor to inform himself concerning his relation toward the public and to his fellow-practitioners.

There are interesting chapters on compensation, the legal collection of fees, suits for mal-practice, criminal liability of the surgeon, the expert witness, collection of professional accounts, etc.

The well-established physician who has bought this knowledge in the costly school of experience will appreciate the value of this book and place it on his ready reference shelf.

Problem of Race-betterment. By J. EWING MEARS, M. D., L.L. D. Philadelphia. Pp. 45. Wm. J. Dornan, Philadelphia, 1910.

This volume consists of a series of essays on the question of relief measures for certain forms of mental, moral and physical degeneration, for the prevention of that large number of defectives that lower our race standards and are a constant menace to future generations. The legal and medical aspects of reducing that large army of the unfit is also discussed.

The book is of value to the student of eugenics and can be read with profit by every thoughtful person.

